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ABSTRACT

This publication contains both a teacher edition and a student edition of materials for a course in graphic arts that covers the process camera, stripping, and platemaking. The course introduces basic concepts and skills necessary for entry-level employment in a graphic communication occupation. The contents of the materials are tied to measurable and observable learning outcomes identified and validated by an industry advisory committee. The teacher edition consists of introductory pages, teacher pages, and the student edition. The introductory pages include the following: information on using the publication; a training and competency profile; a "PrintED" competencies crosswalk that lists the competencies covered in the publication and where they are located by unit number and objective; an instructional and task analysis; a reference for basic skills icons and classifications; a basic skills matrix; and a tools, equipment, and materials list. The teacher pages include suggested activities, answers to assignment sheets, a written test with answers, a learning activities sheet, teacher supplements, and transparency masters. The student edition consists of eight units, each of which typically contains an objective sheet, an information sheet, student supplements, assignment sheets, and job sheets. Unit topics are the following: (1) the process camera and darkroom equipment; (2) line photography; (3) halftone photography; (4) other darkroom techniques; (5) overview of process color photography; (6) stripping procedures; (7) platemaking procedures; and (8) digital impact on prepress activities. (KC)

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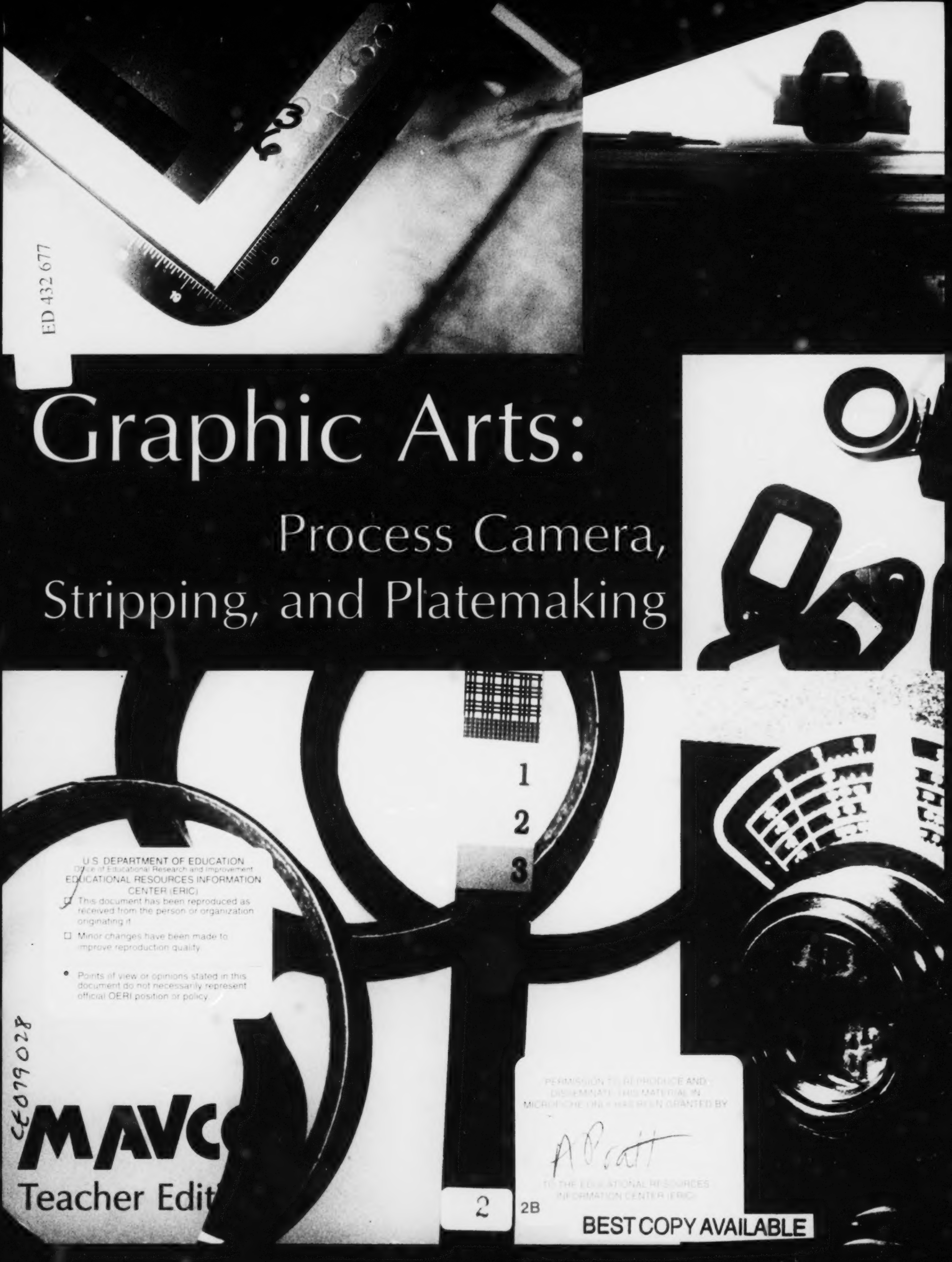

# Graphic Arts:

## Process Camera, Stripping, and Platemaking

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MAVC

Teacher Edit

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# Graphic Arts

# Process Camera, Stripping, and Platemaking

## Fourth Edition

## Teacher Edition

Project coordinated by

Cheryl Barr

Developed by

The Multistate Academic and Vocational Curriculum Consortium, Inc.

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**Units of Instruction**

Unit 1: The Process Camera and Darkroom Equipment

Unit 2: Line Photography

Unit 3: Halftone Photography

Unit 4: Other Darkroom Techniques

Unit 5: Overview of Process Color Photography

Unit 6: Stripping Procedures

Unit 7: Platemaking Procedures

Unit 8: Digital Impact on Prepress Activities

## Foreword

*Graphic Arts: Process Camera, Stripping, and Platemaking* is the second in a series of instructional materials on graphic communication developed by the Multistate Academic and Vocational Curriculum Consortium (MAVCC). This publication introduces basic concepts and skills necessary for a student to be employed in an entry-level graphic communication occupation.

Additional publications in the graphic arts series are as follows:

- *Graphic Arts: Orientation, Composition, and Paste-Up*—Revision
- *Graphic Arts: The Press and Finishing Processes*—Revision
- *Graphic Arts: Electronic Prepress and Publishing*—New

Please contact us concerning the availability of these products.

MAVCC's graphic arts series aligns with the PrintED Accreditation Program administered through Printing Industries of America (PIA). A crosswalk is included aligning this publication with PrintED's image assembly and platemaking tasks and advanced image assembly and platemaking tasks.

### Disclaimer

Based on the size of the community and surrounding communities where students are placed, teachers may choose to overview certain parts of the material or thoroughly cover the material with students.

Teachers whose students are predominantly placed in larger print shops may want to teach parts of this publication as an overview because they will find that many of these tasks have been replaced by electronic prepress in larger print shops. Teachers whose students are more likely to be placed in small print shops may want to thoroughly cover the material because these students will more likely be completing the types of tasks found in this publication.

Jim Fliehler, Chair
Board of Directors
Multistate Academic and
Vocational Curriculum
Consortium

Clark R. Harris
Executive Director
Multistate Academic and
Vocational Curriculum
Consortium

## Acknowledgments

Well-deserved thanks go to the many industry and education representatives who participated as members of MAVCC's graphic arts committees throughout the years. Their assistance in developing and reviewing these instructional materials has been an essential step in MAVCC's development process.

Appreciation is also extended to those individuals who contributed their time and talent to the fourth revision of *Graphic Arts: Process Camera, Stripping, and Platemaking.*

1999 Participants

| | |
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Special recognition is given to John Koonce for revising the first edition, to Dan Crummett for revising the second edition, and to the authors of the original publication—Karim Farajollahi, Gary Ogle, William Reed, and Kenneth Woodcock.

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Special appreciation is extended to Stacy Lee for her assistance in electronic publishing and in creating artwork, and to the employees of the Graphics Division of the Oklahoma Department of Vocational and Technical Education for printing this publication.

## Use of This Publication

*Graphic Arts: Process Camera, Stripping, and Platemaking* is available in both a teacher and student edition. The contents of these materials are tied to measurable and observable learning outcomes that were identified and validated by the advisory committee, comprised of business/industry representatives and teachers. Competencies align with the PrintED task list developed by the Printing Industries of America, Inc. (PIA).

### Teacher Edition

The complete teacher edition consists of introductory pages, teacher pages, and the student edition. Materials are loose-leaf and three-hole punched and are divided into units of instruction that may be broken into more than one lesson or class period. For added flexibility, each unit is individually numbered beginning with a T for teacher page, followed by the unit number and page number.

Example:

Page 17 of Unit 3 in the teacher pages are represented as T 3–17.

**MAVCC**—*Graphic Arts: Process Camera, Stripping, and Platemaking* T 3–17

Page 1 of Unit 5 in the teacher pages are represented as T 5–1.

**MAVCC**—*Graphic Arts: Process Camera, Stripping, and Platemaking* T 5–1

Pages in the student edition are numbered beginning with the unit number, followed by the page number.

Example:

Page 7 of Unit 5 in the student edition is represented as Page 5–7.

**MAVCC**—*Graphic Arts: Process Camera, Stripping, and Platemaking* Page 5–7

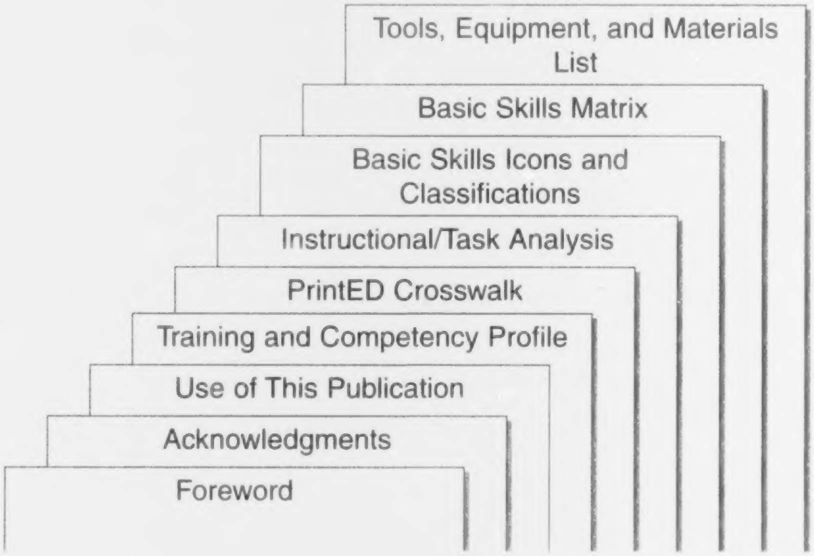
## Use of This Publication

For group instruction, the teacher should determine the best way to teach each objective and allow for student participation. For self-paced or individualized instruction, students should be provided with opportunities to become involved in planning and being responsible for their own education. Careful study of each unit of instruction by the teacher will help to determine the following:

- amount of material that can be covered in each class period;
- supplies and materials required for assignment sheets and job sheets;
- resource people who must be contacted;
- supplementary materials to be ordered;
- skills that must be demonstrated and the amount of class time needed for demonstrations; and
- amount of class time needed for student practice and return demonstrations of mastered skills.

Teachers are encouraged to localize and personalize these materials to meet the needs of individual students, the community, and prospective employers.

### Introductory Pages


Tools, Equipment, and Materials List
Basic Skills Matrix
Basic Skills Icons and Classifications
Instructional/Task Analysis
PrintED Crosswalk
Training and Competency Profile
Use of This Publication
Acknowledgments
Foreword

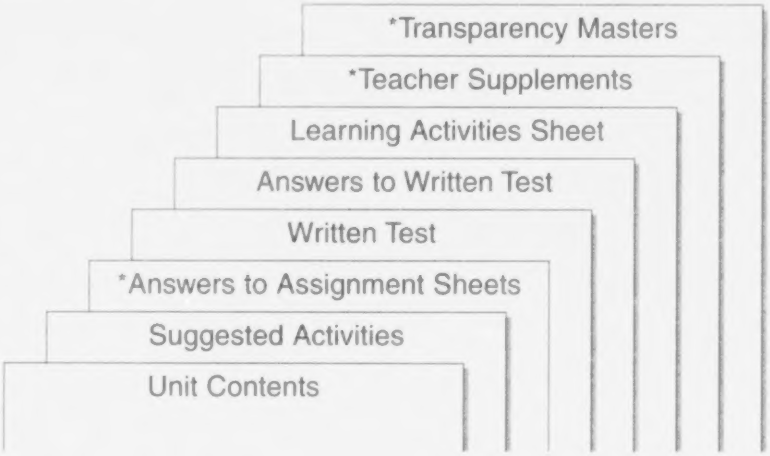
## Use of This Publication

In addition to general information, such as the table of contents, acknowledgments, and the use of this publication, the following tools have been provided to assist administrators and teachers in planning for instruction.

- ☐ **Training and Competency Profile.** This form may be copied and used to record information about each student, such as enrollment dates, class attendance, and work experience, and to document the student's mastery of specific job competencies. It can also be used to provide information about the student's qualifications to potential employers and/or for entry into advanced training programs.
- ☐ **PrintED Crosswalk.** This document identifies the PrintED competencies covered in this publication and lists specifically where these skills are located by unit number and objective.
- ☐ **Instructional/Task Analysis.** This document provides a quick review of the contents of this publication by identifying the cognitive skills (what the student should know) and psychomotor skills (what the student should be able to do) addressed in each unit of instruction.
- ☐ **Basic Skills Icons and Classifications.** This page provides a reference guide of the graphic symbols that are used to identify the basic academic and workplace skills included in each assignment sheet and job sheet.
- ☐ **Basic Skills Matrix.** This document graphically summarizes the academic and workplace skills training included in the instructional materials, unit by unit. It should be helpful to teachers in planning for instruction, and to administrators as documentation that basic skills are being taught as part of the vocational training.
- ☐ **Tools, Equipment, and Materials List.** This document provides a comprehensive list of those items needed in a vocational program for students to complete training. It also can assist administrators and teachers in determining program costs.

## Use of This Publication

### Teacher Pages



*Designates components that may not appear in every unit of instruction

Teachers should study the teacher and student pages before introducing the unit, allowing enough time to obtain supplemental materials and to contact outside resource persons.

☐ **Suggested Activities.** This component assists teachers during the preparation stage of the teaching/learning process by providing an instructional plan, teaching suggestions, a list of references used in the development of each unit, and a list of suggested supplemental resources (books, posters, pamphlets, videotapes, computer software, and Internet sites) that may be used to enhance instruction.

Instructions for evaluating student performance on the assignment sheets and job sheets are also included in the suggested activities section. Teachers should select and discuss with students the rating scale that will be used.

☐ **Answers to Assignment Sheets.** An answer key is provided, when applicable, to assist the teacher in evaluating student performance on a given assignment.

☐ **Written Test.** This component provides criterion-referenced evaluation of every cognitive objective listed in the unit of instruction, and serves as both a pretest and posttest to assist teachers in measuring each student's competency gains. (Assignment sheet and job sheet objectives are not evaluated on the written test.) If the teacher has added, deleted, or modified any objectives, appropriate changes should be made to both the test and answers to the written test.

Tests may be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered. A selection of test items from the units covered may be used for a final test at the end of each term if desired. The written test is included in the teacher edition only and should be duplicated for student use.

☐ **Answers to Written Test.** An answer key is provided to assist the teacher in evaluating student performance on the written test.

☐ **Learning Activities Sheet.** This component provides a model for teachers to use in implementing a self-paced or individualized program, and guides the student through the required components in the student edition (objective sheet, information sheet, student supplements, assignment sheets, and job sheets). The teacher should modify the learning steps as needed to incorporate resources available in the classroom (videotapes, computer software, magazines, etc.) and to address instructional strategies that may be needed to enhance learning for each student. Final copies should be distributed for student use.

The following icons will be used on the learning activities sheet to denote steps that require additional resources:

📖 Read a book, magazine, or journal article

💻 Use a CBT program or other software application

WWW Access a site on the World Wide Web

🖥 Look at PowerPoint® or other computer presentation

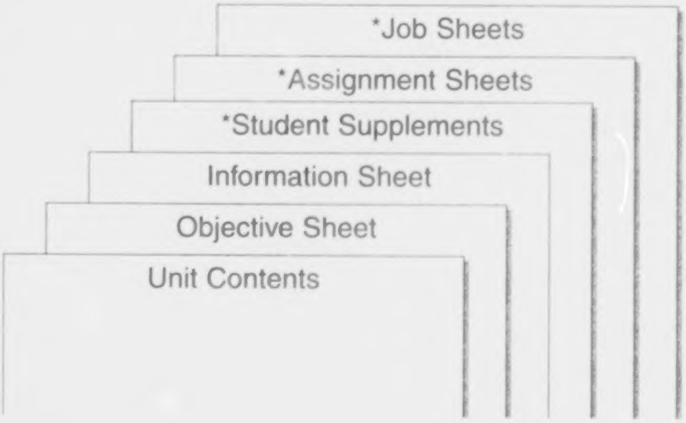
📼 Watch a videotape

☐ **Teacher Supplements.** These are optional materials for the teacher to use. They have three purposes: to provide the teacher with higher-level materials to stretch the advanced student; with remedial information or practice to assist the less-advanced student; and with state-of-the-art information in which the teacher may not have a background or with information that is not readily available in other books. Some teacher supplements may be duplicated for student use and are marked accordingly.

# Use of This Publication

☐ **Transparency Masters.** These overheads are used to direct the students' attention to the topic of classroom discussion. Transparencies allow the student to see as well as hear the information being presented, thus reinforcing the learning process. They may provide illustrations, charts, schematics, or additional information needed to clarify and reinforce objectives included in the unit of instruction. Some of these items may also appear with the appropriate objectives in the information sheet in the student edition. The teacher may make acetate copies from the masters or, in most cases, complete transparency sets are available for purchase.

## Student Edition



*Designates components that may not appear in every unit of instruction

For best results, students should be provided with a copy of the student edition and should be allowed to take notes in the margins as additional information is provided by the instructor or as the student acquires additional information through library or Internet research.

☐ **Objective Sheet.** This component summarizes each unit for the student and teacher. The objective sheet is based on established performance objectives that state the goals for successful completion of a unit of instruction. Objectives are stated in two forms: unit objectives that state the expected performance of each student after completion of the unit and specific (enabling) objectives that state what the student must be able to do to reach the unit objective.

The objectives should be stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods.

Teachers should modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the teacher should remember to supply the needed information, assignment and/or job sheets, and criterion-referenced test items to cover the new objectives.

☐ **Information Sheet.** This component provides the student with the essential information for meeting the cognitive objectives in the unit. Teachers will find that the information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. Students should read the information sheet before the information is discussed in class. Space is provided in the margins for students and teachers to add notes that clarify and/or expand upon the information presented.

☐ **Student Supplements.** This component is included in a unit of instruction when additional information is needed in order for students to complete one or more of the assignment and/or job sheets. Students are not directly tested over the information presented in a supplement; however, their ability to apply this information may be evaluated in the completion of assignment and/or job sheets.

☐ **Assignment Sheets.** The assignment sheets address the learning levels at or above the application level of Bloom's Taxonomy. They provide students with an opportunity to use higher-order thinking skills, such as problem solving, synthesizing, analyzing, and evaluating. In addition, they may provide additional opportunities for students to develop their language skills.

Assignment sheets can be paper-and-pencil activities, as well as those using computer software, videotapes, models, handouts, or other resources as appropriate. Criteria are provided to evaluate student performance objectively.

☐ **Job Sheets.** Job sheets are designed as skill tests and give the instructor direction as to the psychomotor skills to be taught, and provide the criteria to evaluate student performance objectively. They also help provide potential employers with a picture of the skills being taught during training and the performances that might be reasonably expected from an individual who has completed the training.

The teacher should provide students with a copy of each job sheet and/or the procedure's manual and/or job specifications when necessary. The teacher should also discuss the equipment and materials that will be needed for the job and the criteria that will be used to evaluate the student's performance, and demonstrate the procedure prior to having students practice the procedure. Safety should be stressed as part of each demonstration.

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When a student is ready to be evaluated, the teacher should follow the instructions for evaluating student performance which may be found in the suggested activities component of the teacher unit.

As you use these instructional materials we hope that you will find that they contribute to the quality of your program. If any problems occur or if you have any suggestions for improvement of the materials, please write us at 1500 West Seventh Avenue, Stillwater, OK 74074-4364, or e-mail us at mavccweb@okvotech.org.

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# Graphic Arts: Process Camera, Stripping, and Platemaking

## Training and Competency Profile

### Student Information

Program ______________________ Instructor ______________________

Name ______________________ Soc. Sec. No. ______________________

Address ______________________ Phone ______________

Grade ____________ School ______________________

Allergies/Disabilities that might require special accommodation for training (please specify)

______________________________________________

In case of emergency, contact ______________________ Phone ______________

### Record of Enrollment

Date of Enrollment ____-____-____ Total Class Hours ________ Total Hours Absent ________

Date of Withdrawal ____-____-____ Total On-the-Job Training Hours ________ Total Hours Tardy ________

Date of Completion ____-____-____ Total Lab Hours ________

### On-the-Job Training/Work Experience

______________________ ______________________
Place of Employment Address

______________________ ______________________
Supervisor's Name Phone

______________________ ______________________
Duration of Employment Job Title

______________________________________________
Job Responsibilities

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______________________ ______________________
Place of Employment Address

______________________ ______________________
Supervisor's Name Phone

______________________ ______________________
Duration of Employment Job Title

______________________________________________
Job Responsibilities

# Training and Competency Profile

## Student Evaluation

Directions: Evaluate the student using one of the rating scales below. Write the appropriate number to indicate the degree of competency achieved. The descriptions associated with each of the numbers focuses on a level of student performance for each of the tasks listed. The written test scorelines are provided for optional teacher use. They may not be applicable in all cases.

### Sample A

4 **Skilled**—Can perform job with no additional training.
3 **Moderately Skilled**—Has performed job during training program; limited additional training may be required.
2 **Limited Skill**—Has performed job during training program; additional training is required to develop skill.
1 **Unskilled**—Is familiar with process, but is unable to perform job.
0 **No Exposure**—No information or practice provided during training program.

### Sample B

**Yes**—Can perform job with no additional training.
**No**—Is unable to perform job satisfactorily.

### Unit 1: The Process Camera and Darkroom Equipment

______ 1. Collect types of copy.
______ 2. Complete a darkroom safety worksheet.
______ 3. Compile data on chemical hazards in the darkroom.
______ 4. Prepare a darkroom for tray processing, and expose and develop a line negative.
______ 5. ______
______ 6. ______

Written Test Scores
Pretest Score ______%
Posttest Score ______%

### Unit 2: Line Photography

______ 1. Apply an exposure rule for different steps on the gray scale.
______ 2. Set up a process camera and determine exposures.
______ 3. ______
______ 4. ______

Written Test Scores
Pretest Score ______%
Posttest Score ______%

### Unit 3: Halftone Photography

______ 1. Identify halftone dot percentages.
______ 2. Program a Q15 exposure computer and make a halftone negative.
______ 3. Make a duotone.
______ 4. Make a fake duotone.
______ 5. Rescreen a halftone illustration.
______ 6. ______
______ 7. ______

Written Test Scores
Pretest Score ______%
Posttest Score ______%

### Unit 4: Other Darkroom Techniques

______ 1. Determine basic exposure and make a diffusion transfer line print.
______ 2. Program a Q15 exposure computer and make a diffusion transfer halftone print.
______ 3. Make a two-tone posterization using diffusion transfer material.
______ 4. Make a three-tone posterization using special effects screen and diffusion transfer material.
______ 5. Make a three-color posterization using graphic arts film.
______ 6. Make a duplicate negative and a film positive using graphic arts film.
______ 7. Make a spread and choke using graphic arts film.
______ 8. Make a combination print with reversed type overprinted in a second color.
______ 9. ______
______ 10. ______

Written Test Scores
Pretest Score ______%
Posttest Score ______%

### Unit 5: Overview of Process Color Photography

______ 1. Make a set of unmasked direct screen four-color separation negatives.
______ 2. Make an acetate overlay proof.
______ 3. ______
______ 4. ______

Written Test Scores
Pretest Score ______%
Posttest Score ______%

# Training and Competency Profile

## Unit 6: Stripping Procedures

______ 1. Establish true edge and vertical alignment on a stripping table (square up).
______ 2. Strip a ruled flat (right-reading).
______ 3. Lay out and strip an unruled flat (wrong-reading).
______ 4. Strip a flat for single color envelopes.
______ 5. Strip a flat for single color work and turn imposition.
______ 6. Strip a flat for single color work and tumble imposition.
______ 7. Strip for step-and-repeat.
______ 8. Strip a single color flat for a 4-page signature.
______ 9. Lay out signature flats and strip a single color flat for an 8-page signature.
______ 10. Strip a single color step-and-repeat using pin register.
______ 11. Combine line and halftone work.
______ 12. Strip for combination print (double burn with screen tint).
______ 13. Strip complementary flats for multi-color printing.
______ 14. Lay out signature flats for a 16-page signature.
______ 15. Strip a two-color job using pin register and masking film.
______ 16. Determine daylight copy proofing exposure using a step-off test.
______ 17. Expose a blueline or daylight copy proof.
______ 18. ______________________
______ 19. ______________________

Written Test Scores
Pretest Score ________%
Posttest Score ________%

## Unit 7: Platemaking Procedures

______ 1. Expose and develop a subtractive plate.
______ 2. Determine plate exposure using a step-off test.
______ 3. Expose a step-and-repeat plate.
______ 4. Make a step-and-repeat using pin register system.
______ 5. Expose a plate when using a screen tint.
______ 6. Make plates for a two-color job.
______ 7. Expose a photodirect plate
______ 8. ______________________
______ 9. ______________________

Written Test Scores
Pretest Score ________%
Posttest Score ________%

## Unit 8: Digital Impact on Prepress Activities

______ 1. Collect current event material relating to digital printing.
______ 2. Compare and contrast the changes in staffing and training needs in a shop adopting CTP technology.
______ 3. Analyze effects of digital printing on the printer's and customer's view of cost, service, and competitiveness.
______ 4. Create a camera-ready laser copy of a page containing text and graphics.
______ 5. ______________________
______ 6. ______________________

Written Test Scores
Pretest Score ________%
Posttest Score ________%

# Graphic Arts: Process Camera, Stripping, and Platemaking

## PrintED Crosswalk

The following PrintED tasks are covered in this publication. The first column identifies the PrintED task by name and number. The second column identifies the exact location by unit number and objective, assignment sheet, or job sheet number in this MAVCC publication unless otherwise noted.

For more information about PrintED, contact:

Printing Industries of America, Inc.
100 Daingerfield Road
Alexandria, VA 22314-2888

| PrintED Assembly & Platemaking Tasks | MAVCC Tasks |
|---|---|
| 1. Read and comprehend production information from job ticket/jacket. | *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 3—Shop Organization<br>*Graphic Arts: The Press and Finishing Processes*, Unit 5—Job Ticket and Cost Awareness |
| 2. Identify safety considerations in stripping operations.<br>3. Practice safe work habits in stripping operations. | *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 2—Shop Safety |
| 4. Identify basic hand tools in stripping.<br>5. Identify basic materials in stripping.<br>6. Identify basic equipment in stripping. | Unit 6, Objective 2—Uses of stripping tools and materials |
| 7. Establish "true edge" and "vertical alignment" on a stripping table (square up). | Unit 6, Job Sheet 1—Establish true edge and vertical alignment on a stripping table (square up) |
| 8. Lay out, measure and rule an unlined masking sheet showing relevant guidelines (edge of sheet, gripper margins, plate clamp, center marks, etc.) for 8 1/2" x 11" single color work. | Unit 6, Job Sheet 3—Lay out and strip an unruled flat (wrong-reading) |
| 9. Assemble and strip an 8 1/2" x 11" negative. | Unit 6, Job Sheet 2—Strip a ruled flat (right-reading)<br>Unit 6, Job Sheet 3—Lay out and strip an unruled flat (wrong-reading) |
| 10. Make appropriate corrections to film negative and flat. | Unit 6, Job Sheets 2 through 13 |

## PrintED Crosswalk

| PrintED Assembly & Platemaking Tasks | MAVCC Tasks |
|---|---|
| 11. Lay out, measure and rule an unlined masking sheet showing relevant guidelines (edge of sheet, gripper margins, plate clamp, center marks, etc.) for 11″ x 17″ single color work. | Unit 6, Job Sheet 2—Strip a ruled flat (right-reading) |
| 12. Assemble and strip single color flat for 11″ x 17″ using pre-ruled masking sheet. | Unit 6, Job Sheet 2—Strip a ruled flat (right-reading) |
| 13. Lay out, measure and rule an unlined masking sheet showing relevant guidelines (edge of sheet, gripper margins, plate clamp, center marks, etc.) for 8 1/2″ x 11″ multi-color work using pin register system. | Unit 6, Job Sheet 15—Strip a two-color job using pin register and masking film |
| 14. Strip a flat for single color envelopes. | Unit 6, Job Sheet 4—Strip a flat for single color envelopes |
| 15. Strip a flat for single color work and turn imposition. | Unit 6, Job Sheet 5—Strip a flat for single color work and turn imposition |
| 16. Strip a flat for single color work and tumble imposition. | Unit 6, Job Sheet 6—Strip a flat for single color work and tumble imposition |
| 17. Strip a single color flat that includes screen tints. | Unit 6, Job Sheet 12—Strip for combination print (double burn with screen tint) |
| 18. Strip single color flats for a 4-page signature. | Unit 6, Job Sheet 8—Strip a single color flat for a 4-page signature |
| 19. Strip a single color flat for an 8-page signature. | Unit 6, Job Sheet 9—Lay out signature flats and strip a single color flat for an 8-page signature |
| 20. Strip a line and halftone combination flat. | Unit 6, Job Sheet 11—Combine line and halftone work |
| 21. Strip a multicolor job with color quality control bars for a 4-page signature. | |
| 22. Strip a single color step and repeat flat (without pin register). | Unit 6, Job Sheet 7—Strip for step-and-repeat |
| 23. Strip single color step and repeat flat using a pin register system. | Unit 6, Job Sheet 10—Strip a single color step-and-repeat using pin register |

| PrintED Assembly & Platemaking Tasks | MAVCC Tasks |
|---|---|
| 24. Check registration of multiple flats using daylight proofing material. | Unit 6, Job Sheet 17—Expose a blueline or daylight copy proof |
| 25. Strip a multicolor job that uses masking film as a mechanical negative on one. | Unit 6, Job Sheet 15—Strip a two-color job using pin register and masking film |
| 26. Identify and strip a multi-color job using registration marks and clear masking materials. | Unit 6, Job Sheet 15—Strip a two-color job using pin register and masking film |
| 27. Proof color work with color proofing materials. | Unit 5, Job Sheet 2—Make an acetate overlay proof |
| 28. Produce a dummy for a book with a lip signature. | |
| 29. Produce a 16-page signature dummy with proper imposition, pagination and directions. | Unit 6, Job Sheet 14—Lay out signature flats for a 16-page signature |
| 30. Identify safety considerations for platemaking. | Unit 7, Objective 8—Do's and don'ts for properly handling plates and chemicals |
| 31. Practice safe work habits in platemaking operations. | *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 2—Shop Safety |
| 32. Identify basic parts of the platemaker and metal plates. | Unit 7, Objective 2—Types of plate ends; Objective 3—Types of offset plates and their characteristics; Objective 4—Plate exposing devices |
| 33. Identify basic parts of the photo direct or direct transfer platemaker. | Unit 7, Job Sheet 7—Expose a photodirect plate |
| 34. Identify plate materials and plate types. | Unit 7, Objective 2—Types of plate ends; Objective 3—Types of offset plates and their characteristics |
| 35. Identify processing chemicals and methods. | Unit 7, Objective 5—Types of presensitized plates and their characteristics; Objective 6—Gumming of plates |
| 36. Identify platemaking procedures for metal plates. | Unit 7, Job Sheet 1—Expose and develop a subtractive plate |
| 37. Determine exposure time for metal plates using transparent step scale and rub down test. | Unit 7, Job Sheet 2—Determine plate exposure using a step-off test |

## PrintED Crosswalk

| PrintED Assembly & Platemaking Tasks | MAVCC Tasks |
|---|---|
| 38. Prepare metal plates (expose, process and store). | Unit 7, Job Sheet 1—Expose and develop a subtractive plate |
| 39. Make additions, deletions and repairs to an offset plate. | Unit 7, Job Sheet 6—Make plates for a two-color job |
| 40. Define CTP technology. | Unit 8, Objective 2—Types of digital printing systems |
| 41. Observe an image assembly and platemaking operation at a commercial printer. | *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 1, Assignment Sheet 3—Visit a printing shop |

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## PrintED Crosswalk

*Graphic Arts: Process Camera, Stripping, and Platemaking* introduces basic concepts and skills necessary for a student to be employed in an entry-level graphic communication occupation. Advanced image assembly and platemaking tasks are not covered by this publication.

| PrintED Advanced Image Assembly & Platemaking Tasks | MAVCC Tasks |
|---|---|
| 1. Read advanced image and comprehend production information from job ticket/jacket. | *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 3—Shop Organization<br>*Graphic Arts: The Press and Finishing Processes*, Unit 5—Job Ticket and Cost Awareness |
| 2. Identify safety considerations in the image assembly platemaking area. | Unit 7, Objective 8—Do's and don'ts for properly handling plates and chemicals |
| 3. Read and comprehend material safety data sheets. | Unit 1, Assignment Sheet 3—Compile data on chemical hazards in the darkroom<br>*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 2—Shop Safety |
| 5. List the characteristics and uses of the various exposure systems. | Unit 7, Objective 4—Plate exposing devices |
| 11. Understand total pin register systems. | Unit 6, Objective 7—Stripping register marks and pins |
| 20. Demonstrate various imposition systems such as work & turn, work & tumble (or flop), perfecting, high-folio and nesting. | Unit 6, Job Sheet 5—Strip a flat for single color work and turn imposition; Unit 6, Job Sheet 6—Strip a flat for single color work and tumble imposition |
| 22. Describe color theory. | Unit 5, Objective 2—Primary colors |
| 23. Describe the methods of screen angling as used in process color assembly. | Unit 5, Objective 4—Color separation |
| 30. Produce a blueline proof. | Unit 6, Job Sheet 17—Expose a blueline or daylight copy proof |
| 35. Identify current trends in your local area. | Unit 8, Assignment Sheet 1—Collect current event material relating to digital printing<br>Unit 8, Assignment Sheet 3—Analyze effects of digital printing on the printer's and customer's view of cost, service, and competitiveness |

## Instructional/Task Analysis

**Related Information: What the Student Should Know**

**Application: What the Student Should Be Able to Do**

### Unit 1: The Process Camera and Darkroom Equipment

1. Definition of a process camera
2. Parts of a process camera
3. Functions of parts of a process camera
4. Types of camera copy
5. Darkroom equipment/supplies
6. Types of camera film
7. Darkroom cleanliness
8. Darkroom safety
9. Interpret Hazardous Materials Identification System (HMIS) labels
10. Collect types of copy
11. Complete a darkroom safety worksheet
12. Compile data on chemical hazards in the darkroom
13. Prepare a darkroom for tray processing, and expose and develop a line negative

### Unit 2: Line Photography

1. Terms and definitions
2. Principles of line photography
3. Types of film base material
4. Types of emulsion
5. Degrees of density
6. Exposure rule for recording density
7. Parts of a typical lens assembly
8. Characteristics of an aperture
9. Functions of filters
10. Apply an exposure rule for different steps on the gray scale
11. Set up a process camera and determine exposures

# Instructional/Task Analysis

| Related Information: What the Student Should Know | Application: What the Student Should Be Able to Do |
|---|---|
| **Unit 3: Halftone Photography** | |
| 1. Terms and definitions | 6. Identify halftone dot percentages |
| 2. Types of contact screens | 7. Program a Q15 exposure computer and make a halftone negative |
| 3. Care of contact screens | 8. Make a duotone |
| 4. Halftone dot percentages | 9. Make a fake duotone |
| 5. Procedures for avoiding moires in rescreening | 10. Rescreen a halftone illustration |
| **Unit 4: Other Darkroom Techniques** | |
| 1. Terms and definitions | 4. Determine basic exposure and make a diffusion transfer line print |
| 2. Care of a diffusion transfer processor | 5. Program a Q15 exposure computer and make a diffusion transfer halftone print |
| 3. Materials and equipment necessary to make a diffusion transfer print | 6. Make a two-tone posterization using diffusion transfer material |
| | 7. Make a three-tone posterization using special effects screen and diffusion transfer material |
| | 8. Make a three-color posterization using graphic arts film |
| | 9. Make a duplicate negative and a film positive using graphic arts film |
| | 10. Make a spread and choke using graphic arts film |
| | 11. Make a combination print with reversed type overprinted in a second color |

**Related Information: What the Student Should Know**

**Application: What the Student Should Be Able to Do**

## Unit 5: Overview of Process Color Photography

1. Terms and definitions
2. Additive and subtractive primary colors
3. Functions of printing inks
4. Color separation
5. Methods for making color corrections
6. Make a set of unmasked direct screen four-color separation negatives
7. Make an acetate overlay proof

## Unit 6: Stripping Procedures

1. Terms and definitions
2. Stripping tools and materials
3. Parts on a layout of a typical flat
4. Emulsion side and base side of a negative
5. Methods of combining line and halftone work
6. Types of combination printing
7. Stripping register marks and pins
8. Establish true edge and vertical alignment on a stripping table (square up)
9. Strip a ruled flat (right-reading)
10. Lay out and strip an unruled flat (wrong-reading)
11. Strip a flat for single color envelopes
12. Strip a flat for single color work and turn imposition
13. Strip a flat for single color work and tumble imposition
14. Strip for step-and-repeat
15. Strip a single color flat for a 4-page signature
16. Lay out signature flats and strip a single color flat for an 8-page signature
17. Strip a single color step-and-repeat using pin register
18. Combine line and halftone work
19. Strip for combination print (double burn with screen tint)
20. Strip complementary flats for multi-color printing

# Instructional/Task Analysis

**Related Information: What the Student Should Know**

**Application: What the Student Should Be Able to Do**

## Unit 6: Stripping Procedures (continued)

21. Lay out signature flats for a 16-page signature
22. Strip a two-color job using pin register and masking film
23. Determine daylight copy proofing exposure using a step-off test
24. Expose a blueline or daylight copy proof

## Unit 7: Platemaking Procedures

1. Terms and definitions
2. Types of plate ends
3. Types of offset plates
4. Plate exposing devices
5. Types of presensitized plates
6. Gumming of plates
7. Handling and storing plates
8. Do's and don'ts for properly handling plates and chemicals

9. Expose and develop a subtractive plate
10. Determine plate exposure using a step-off test
11. Expose a step-and-repeat plate
12. Make a step-and-repeat plate using pin register system
13. Expose a plate when using a screen tint
14. Make plates for a two-color job
15. Expose a photodirect plate

## Unit 8: Digital Impact on Prepress Activities

1. Terms and definitions
2. Types of digital printing systems
3. Types of computer-to-plate printing systems
4. Unique capability of computer-to-print systems
5. Three technologies using computer-to-print engineering
6. Traditional printing vs. digital printing

7. Collect current event material relating to digital printing
8. Compare and contrast the changes in staffing and training needs in a shop adopting CTP technology
9. Analyze effect of digital printing on the printer's and customer's view of cost, service, and competitiveness
10. Create a camera-ready laser copy of a page containing text and graphics

## Basic Skills Icons and Classifications

To assist teachers and students in identifying and documenting where academic and workplace skills are being taught, MAVCC has adopted a system that uses icons and a list of specific tasks to identify the skill or skills that are used in each assignment sheet and job sheet.

A matrix for each of the ten broad skill areas has been included in this edition and reflects key elements from *What Work Requires of Schools: A SCANS Report for America 2000*, a 1991 study by the U.S. Department of Labor; *Workplace Basics: The Skills Employers Want*, a three-year study conducted jointly by the American Society for Training and Development (ASTD) and the United States Department of Labor (DOL); and other national and state sources.

Each of the ten broad skill areas—reading, writing, math, science, oral communication, interpersonal or relating, critical thinking, employability, social studies, and technology—is represented by the icon presented below.

### Reading Skills

- Reading Comprehension
- Research/Reference
- Functional Reading

### Writing Skills

- Language
- Composition
- Research
- Functional Writing

### Math Skills

- Operation and Calculation
- Math Application
- Data Analysis and Display
- Functional Math

## Basic Skills Icons and Classifications

### Science Skills

- General Science
- Life Science
- Physical Science
- Earth Science

### Oral Communication Skills

- Oral Presentation
- Listening
- Interactive Communication

### Interpersonal or Relating Skills

- General Relating
- Teamwork/Cooperation
- Leadership/Influence

### Critical Thinking Skills

- Cognitive Activities

### Employability Skills

- Job Search/Selections
- Job Acquisition/Development
- Resource Management
- Job Safety

### Social Studies Skills

- Information Analysis
- Social Studies Application
- Functional Social Studies

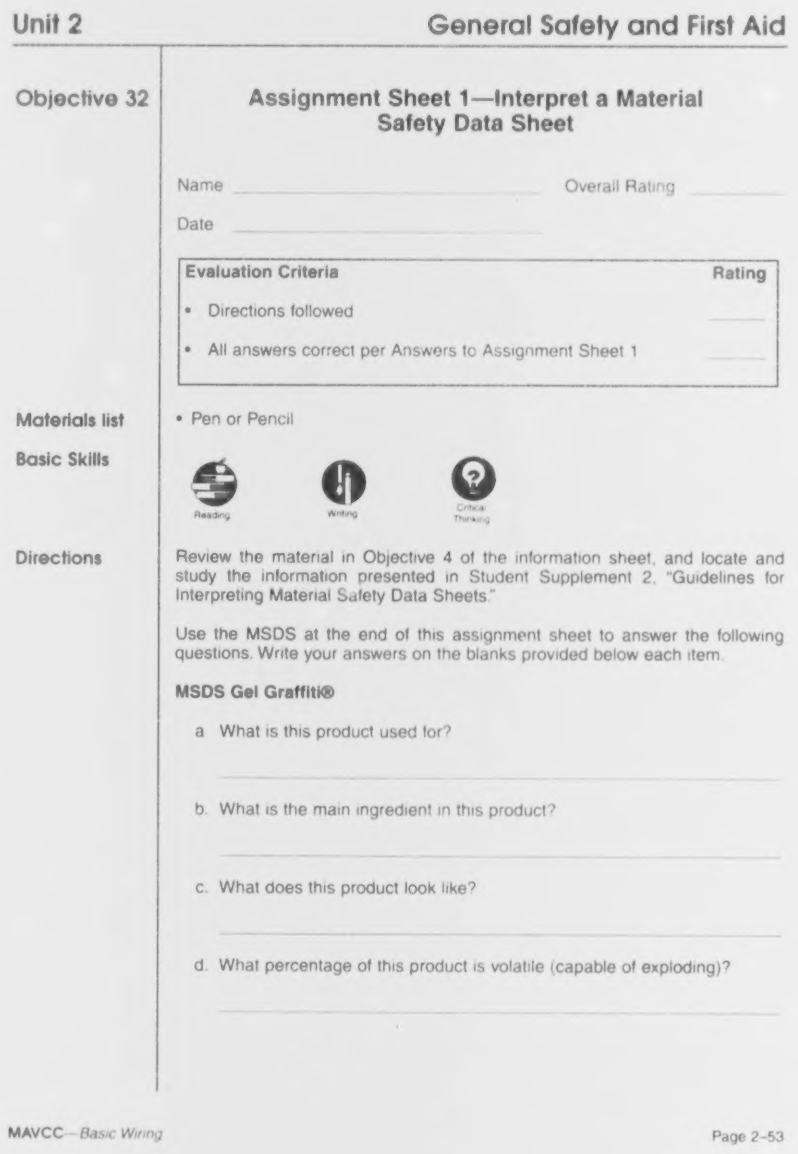
### Technology Skills

- Selection
- Application
- Maintenance/Troubleshooting

## Basic Skills Icons and Classifications

When an activity involving one of these basic skills is identified, the corresponding icon is placed on the assignment sheet and job sheet. Skills training is further defined by classifying specific skills that are required. (See skills list that may be found on each basic skills matrix.)

Example:



**Unit 2** **General Safety and First Aid**

**Objective 32**

### Assignment Sheet 1—Interpret a Material Safety Data Sheet

Name ____________ Overall Rating ________

Date ____________

| **Evaluation Criteria** | **Rating** |
|---|---|
| • Directions followed | ______ |
| • All answers correct per Answers to Assignment Sheet 1 | ______ |

**Materials list**
- Pen or Pencil

**Basic Skills**

Reading Writing Critical Thinking

**Directions**

Review the material in Objective 4 of the information sheet, and locate and study the information presented in Student Supplement 2, "Guidelines for Interpreting Material Safety Data Sheets."

Use the MSDS at the end of this assignment sheet to answer the following questions. Write your answers on the blanks provided below each item.

**MSDS Gel Graffiti®**

a. What is this product used for?

______________________________

b. What is the main ingredient in this product?

______________________________

c. What does this product look like?

______________________________

d. What percentage of this product is volatile (capable of exploding)?

______________________________

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## Basic Skills Matrix

# Unit 1: The Process Camera and Darkroom Equipment

**Academic and Workplace Skills**

| Obj. # | Objective | Icon | Skill | Sub Skill | Description |
|---|---|---|---|---|---|
| 10 | Collect types of copy (A.S. 1) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | See relationship between two or more ideas, objects, or situations |
| 11 | Complete a darkroom safety worksheet (A.S. 2) | 📚 | Reading | Reading comprehension | Determine what information is needed |
| | | | | Functional reading | Follow written instructions |
| | | ✎ | Writing | Language | State ideas clearly |
| 12 | Compile data on chemical hazards in the darkroom (A.S. 3) | 📚 | Reading | Reading comprehension | Gain factual information; analyze and apply what has been read to a specific task |
| | | | | Functional reading | Follow written instructions |
| | | ✎ | Writing | Language | State ideas clearly |
| | | 🗣 | Oral Communication | Oral presentation | Make informative presentations |
| | | | | Interactive communication | Work effectively in a group |
| | | 💡 | Critical Thinking | Cognitive activities | Collect/record information |
| 13 | Prepare a darkroom for tray processing, and expose and develop a line negative (J.S. 1) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to a specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |

# Basic Skills Matrix

## Unit 2: Line Photography

| Academic and Workplace Skills | | | | | |
|---|---|---|---|---|---|
| **Obj. #** | **Objective** | **Icon** | **Skill** | **Sub Skill** | **Description** |
| 10 | Apply an exposure rule for different steps on the gray scale (A.S. 1) | | Reading | Functional reading | Follow written instructions |
| | | | Math | Functional math | Apply computation skills as they are actually used on the job |
| 11 | Set up a process camera and determine exposures (J.S. 1) | | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | | Math | Math application | Select/apply mathematical formula |
| | | | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| | | | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |

# Unit 3: Halftone Photography

## Academic and Workplace Skills

| Obj. # | Objective | Icon | Skill | Sub Skill | Description |
|---|---|---|---|---|---|
| 6 | Identify halftone dot percentages (A.S. 1) | 📚 | Reading | Functional reading | Follow written instructions |
| 7 | Program a Q15 exposure computer and make a halftone negative (J.S. 1) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 🔢 | Math | Functional math | Apply computation skills as they are actually used on the job |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 8 | Make a duotone (J.S. 2) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 🔢 | Math | Functional math | Apply computation skills as they are actually used on the job; use measuring device to construct lines and angles |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |

## Basic Skills Matrix

## Unit 3: Halftone Photography (continued)

| Academic and Workplace Skills | | | | | |
|---|---|---|---|---|---|
| **Obj. #** | **Objective** | **Icon** | **Skill** | **Sub Skill** | **Description** |
| 9 | Make a fake duotone (J.S. 3) | | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | | Math | Functional math | Apply computation skills as they are actually used on the job |
| | | | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 10 | Rescreen a halftone illustration (J.S. 4) | | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |

# Unit 4: Other Darkroom Techniques

## Academic and Workplace Skills

| Obj. # | Objective | Icon | Skill | Sub Skill | Description |
|---|---|---|---|---|---|
| 4 | Determine basic exposure and make a diffusion transfer line print (J.S. 1) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | ? | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 5 | Program a Q15 exposure computer and make a diffusion transfer halftone print (J.S. 2) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | ? | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 6 | Make a two-tone posterization using diffusion transfer material (J.S. 3) | 📚 | Reading | Functional reading | Follow written instructions |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 7 | Make a three-tone posterization using special effects screen and diffusion transfer material (J.S. 4) | 📚 | Reading | Functional reading | Follow written instructions |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |

# Basic Skills Matrix

## Unit 4: Other Darkroom Techniques (continued)

### Academic and Workplace Skills

| Obj. # | Objective | Icon | Skill | Sub Skill | Description |
|---|---|---|---|---|---|
| 8 | Make a three-color posterization using graphic arts film (J.S. 5) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 9 | Make a duplicate negative and a film positive using graphic arts film (J.S. 6) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 10 | Make a spread and choke using graphic arts film (J.S. 7) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |

## Unit 4: Other Darkroom Techniques (continued)

### Academic and Workplace Skills

| Obj. # | Objective | Icon | Skill | Sub Skill | Description |
|---|---|---|---|---|---|
| 11 | Make a combination print with reversed type overprinted in a second color (J.S. 8) | | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | ? | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |

# Basic Skills Matrix

## Unit 5: Overview of Process Color Photography

| Academic and Workplace Skills | | | | | |
|---|---|---|---|---|---|
| **Obj. #** | **Objective** | **Icon** | **Skill** | **Sub Skill** | **Description** |
| 6 | Make a set of unmasked direct screen four-color separation negatives (J.S. 1) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution; collect/record information |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 7 | Make an acetate overlay proof (J.S. 2) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution; collect/record information |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |

# Unit 6: Stripping Procedures

## Academic and Workplace Skills

| Obj. # | Objective | Icon | Skill | Sub Skill | Description |
|---|---|---|---|---|---|
| 8 | Establish true edge and vertical alignment on a stripping table (square up) (J.S. 1) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 🔢 | Math | Functional math | Makes measurements; use measuring device to construct lines |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 9 | Strip a ruled flat (right-reading) (J.S. 2) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 10 | Lay out and strip an unruled flat (wrong-reading) (J.S. 3) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 🔢 | Math | Functional math | Makes measurements; use measuring device to construct lines |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 11 | Strip a flat for single color envelopes (J.S. 4) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 12 | Strip a flat for single color work and turn imposition (J.S. 5) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 🔢 | Math | Functional math | Makes measurements; use measuring device to construct lines |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |

# Basic Skills Matrix

## Unit 6: Stripping Procedures (continued)

| Academic and Workplace Skills | | | | | |
|---|---|---|---|---|---|
| **Obj. #** | **Objective** | **Icon** | **Skill** | **Sub Skill** | **Description** |
| 13 | Strip a flat for single color work and tumble imposition (J.S. 6) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 🔢 | Math | Functional math | Makes measurements; use measuring device to construct lines |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 14 | Strip for step-and-repeat (J.S. 7) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 15 | Strip a single color flat for a 4-page signature (J.S. 8) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 🔢 | Math | Functional math | Makes measurements; use measuring device to construct lines |
| 16 | Lay out signature flats and strip a single color flat for an 8-page signature (J.S. 9) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 🔢 | Math | Functional math | Makes measurements; use measuring device to construct lines |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 17 | Strip a single color step-and-repeat using pin register (J.S. 10) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 🔢 | Math | Functional math | Makes measurements; use measuring device to construct lines |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |

# Unit 6: Stripping Procedures (continued)

## Academic and Workplace Skills

| Obj. # | Objective | Icon | Skill | Sub Skill | Description |
|---|---|---|---|---|---|
| 18 | Combine line and halftone work (J.S. 11) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | ? | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 19 | Strip for combination print (double burn with screen tint) (J.S. 12) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | ? | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 20 | Strip complementary flats for multi-color printing (J.S. 13) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | ? | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 21 | Lay out signature flats for a 16-page signature (J.S. 14) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | ? | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 22 | Strip a two-color job using pin register and masking film (J.S. 15) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | ? | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |
| 23 | Determine daylight copy proofing exposure using a step-off test (J.S. 16) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | ? | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |

# Basic Skills Matrix

## Unit 6: Stripping Procedures (continued)

| Academic and Workplace Skills | | | | | |
|---|---|---|---|---|---|
| **Obj. #** | **Objective** | **Icon** | **Skill** | **Sub Skill** | **Description** |
| 24 | Expose a blueline or daylight copy proof (J.S. 17) | | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| | | | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |

# Unit 7: Platemaking Procedures

## Academic and Workplace Skills

| Obj. # | Objective | Icon | Skill | Sub Skill | Description |
|---|---|---|---|---|---|
| 9 | Expose and develop a subtractive plate (J.S. 1) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 10 | Determine plate exposure using a step-off test (J.S. 2) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 11 | Expose a step-and-repeat plate (J.S. 3) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 12 | Make a step-and-repeat plate using pin register system (J.S. 4) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations |

## Basic Skills Matrix

### Unit 7: Platemaking Procedures (continued)

| Academic and Workplace Skills | | | | | |
|---|---|---|---|---|---|
| **Obj. #** | **Objective** | **Icon** | **Skill** | **Sub Skill** | **Description** |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 13 | Expose a plate when using a screen tint (J.S. 5) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 14 | Make plates for a two-color job (J.S. 6) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |
| 15 | Expose a photodirect plate (J.S. 7) | 📚 | Reading | Reading comprehension | Analyze and apply what has been read to specific task |
| | | | | Functional reading | Follow written instructions |
| | | 💡 | Critical Thinking | Cognitive activities | Transfer knowledge/training to new situations; draw conclusions; devise a solution |
| | | ⛑ | Employability | Job safety | Demonstrate safe use of tools, equipment, and supplies |
| | | ⚛ | Technology | Application | Demonstrate the proper procedures for setting up and operating equipment |

# Unit 8: Digital Impact on Prepress Activities

| Academic and Workplace Skills | | | | | |
|---|---|---|---|---|---|
| **Obj. #** | **Objective** | **Icon** | **Skill** | **Sub Skill** | **Description** |
| 7 | Collect current event material relating to digital printing (A.S. 1) | 📚 | Reading | Research/ reference | Locate resources; find materials in library; use computer; use magazines and newspapers |
| | | | | Functional reading | Follow written instructions |
| | | 💼 | Employability | Job search/ selections | Investigate training requirements for a career field/occupation |
| 8 | Compare and contrast the changes in staffing and training needs in a shop adopting CTP technology (A.S. 2) | 📚 | Reading | Reading comprehension | Gain factual information; comprehend written information for main ideas |
| | | | | Functional reading | Follow written instructions |
| | | ✎ | Writing | Language | Use standard grammar, spelling, and capitalization; state ideas clearly |
| | | | | Composition | Use complete sentences; compose report |
| | | 💡 | Critical Thinking | Cognitive activities | Analyze/synthesize information; draw conclusions; see relationship between two or more ideas, objects, or situations |
| | | 💼 | Employability | Job search/ selections | Investigate employment prospects of a career field/occupation; investigate training requirements for a career field/occupation |
| 9 | Analyze effects of digital printing on the printer's and customer's view of cost, service, and competitiveness (A.S. 3) | 📚 | Reading | Reading comprehension | Gain factual information; comprehend written information for main ideas |
| | | | | Functional reading | Follow written instructions |
| | | ✎ | Writing | Language | Use standard grammar, spelling, and capitalization; state ideas clearly |
| | | | | Composition | Use complete sentences; compose report |
| | | 💡 | Critical Thinking | Cognitive activities | Analyze/synthesize information; draw conclusions; see relationship between two or more ideas, objects, or situations |
| 10 | Create a camera-ready laser copy of a page containing text and graphics (J.S. 1) | 📚 | Reading | Functional reading | Follow written instructions |
| | | ⚛ | Technology | Application | Demonstrate the proper procedure for setting up and operating equipment, including computers |

## Tools, Equipment, and Materials List

- Absorbent paper
- Acetate overlays
- Activator
- Amberlith or rubylith
- Black fine or medium point pen
- Black felt tip pen
- Black photographic tape
- Blueline or daylight copy proofing material
- Bond
- Cardboard
- Card stock, white
- Cheese cloth
- Color key
- Contact film
- Contact frame/vacuum printer
- Contact screens
- Continuous tone copy
- Cotton pads
- Darkroom equipment
- Darkroom timer
- Density guide or densitometer
- Developer
- Diffusion transfer activator
- Diffusion transfer gray contact screen
- Diffusion transfer negative paper
- Diffusion transfer processor
- Diffusion transfer receiver paper
- Duplicating film
- Film hole fitters
- Filter holder
- Filters
- Fixer solution
- Flash lamp, 7 1/2 watt bulb
- Flats
- Glass cleaner and wipes
- Graduate
- Graphic arts film
- Graphic file
- Gray scale
- Halftone film
- Illustration board
- Kodak Color Separation Guide
- Kodak Direct Screen Calculator, Q-10B
- Kodak Q15 Exposure Computer

## Tools, Equipment, and Materials List

Kodak 24-Step Reflection Density Guide, Q-16
Laser printer
Light table
Line gauge
Litho film
Litho tape
Magnifier, 10-power
Masking sheets, ruled and unruled
Masking tape
Negatives
Offset plates
Opaque brush and opaque solution or opaquing pen
Page-layout software
Panchromatic film
Paper pad
Paper towels
Paste-up equipment
Personal computer
Photodirect platemaker
Plate exposure device
Plate processing chemicals
Preangled chipboard
Presensitized subtractive plate
Process camera
Protractor
Register marks
Register punch and pins
Ruler
Scissors
Screwdriver
Sink
Spacer material
Sponge or pad applicator
Squeegee
Stop bath
Storage containers
Stripping equipment
Stripping knife
Tape dispenser
Templates
Text file
Thermometer
Transparent tape
Trays
Triangle
T-square
Vacuum exposing unit

# Unit 1

# The Process Camera and Darkroom Equipment

## Unit Contents

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Teacher Page

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Transparency Masters

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Student Page

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3—Compile Data on Chemical Hazards in the Darkroom . . . . . . . . 1–17

Job Sheet

1—Prepare a Darkroom for Tray Processing, and Expose and Develop a Line Negative . . . . . . . . . . 1–19

## Suggested Activities

**Instructional Plan**

### Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resource" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make transparencies from the transparency masters included in this unit. These appear in the teacher edition only.

### Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

## Suggested Activities

- Discuss the assignment sheets. Review with students the criteria for evaluation of these activities.

  Note: Assignment Sheet 1 must be completed before starting Job Sheet 1. Students will use their copy collection to complete this activity.

- Discuss and demonstrate the job sheet. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of this activity and the rating scale that will be used to indicate job performance.

Teaching Suggestions

- Discuss with students the fact that equipment and processes in this unit are rapidly being digitized and relegated to computer tasks. See Unit 8 for more information.

- Discuss advantages and disadvantages of vertical and horizontal cameras.

- Show students different examples of types of camera copy and discuss how each type will reproduce if exposed as a line negative.

- Discuss usage of different types of graphic arts camera film.

- Give students a tour of the camera/darkroom area. Thoroughly discuss darkroom safety according to Assignment Sheet 2.

- Review material safety data sheets (MSDS) for Hazardous Material Identification System (HMIS) information and, if desired, have students label darkroom chemicals with approved HMIS labels.

  Note: MSDS sheets with HMIS labeling information are available through your local graphic arts supplier.

- Provide students with copies of the material safety data sheets for each chemical used in your facility's darkroom (See Assignment Sheet 3). Make sure each chemical has been presented. Emphasize to students the hazards involved in working with photographic processing chemicals and necessary precautions.

- Discuss with students the importance of proper disposal of photochemicals. Contact your local waste disposal service and your local sewer authority for information on the correct methods of disposing of photochemicals in your area.

- Demonstrate process camera set-up and operation procedure. Include making exposure, film processing, and negative evaluation.

## Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.

- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.

- Evaluate the assignment sheets. Rate the student using the criteria listed on each assignment sheet. See Answers to Assignment Sheets for correct answers where applicable. If the student's performance is unacceptable, have the student review the appropriate materials and complete the assignment again.

- Evaluate the job sheet. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

  Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

  **Sample A**

  4—**Skilled**—Can perform job with no additional training.
  3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
  2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
  1—**Unskilled**—Is familiar with process, but is unable to perform job.
  0—**No exposure**—No information or practice provided during training program.

  **Sample B**

  **Yes**—Can perform job with no additional training.
  **No**—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.

## Suggested Activities

- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

**Resources Used in Developing This Unit**

**Print Media**

- Bentley, R.G.; J.C. Olson; C.E. Strandberg; and R.E. Wiper. *Graphic Communications Series: Transparency Originals.* Chicago, IL: A.B. Dick Company.
- Cogoli, John E. *Photo-Offset Fundamentals.* Old Tappan, NJ: Macmillan Publishing Co., 1986.
- Destree, Thomas M. *The Lithographers Manual.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.

**Suggested Supplemental Resource**

**Electronic Media**

- *The OSHA Hazard Communication Standard for the Printing Industry.* (No. 4215). This 21-minute videotape demonstrates the five requirements you must fulfill to comply with the OSHA Standard. Available from:

  Graphic Arts Technical Foundation
  P.O. Box 1020
  Sewickley, PA 15143-1020
  Phone (U.S. and Canada): 800/662-3916
  Phone (all other countries): 412/741-5733
  Fax: 412/741-0609
  Website: http://www.gatf.org/products.html
  Email: gatforders@abdintl.com

## Answers to Assignment Sheets

**Assignment Sheet 1**

**Collect Types of Copy**

When evaluating this assignment, refer to the evaluation criteria on the assignment sheet.

**Assignment Sheet 2**

**Complete a Darkroom Safety Worksheet**

1. Instructor, instructor
2. Personal protective devices
3. Store chemicals in nonbreakable containers on the lowest available shelf
4. Turned off and unplugged
5. Identify the source of irritant, obtain treatment to relieve symptoms, and use appropriate protective device(s) to avoid reoccurrence
6. Clean it up immediately to avoid slips or falls
7. Pour chemicals into the water
8. Put the film down and make sure hands are dry
9. Eyewash station
10. White room lights

**Assignment Sheet 3**

**Compile Data on Chemical Hazards in the Darkroom**

When evaluating this assignment, refer to the evaluation criteria on the assignment sheet.

## Written Test

Name ______________________________

Date ______________________ Score __________

**Objective 1**

Define process camera. ______________________________

______________________________

**Objective 2**

Identify the parts of the process cameras on the following page by filling in the blanks with the numbers that correspond with the answers. Answers may be used more than once.

1. Bellows
2. Camera lights
3. Copyboard
4. Copyboard control
5. Diaphragm
6. Film back
7. Ground glass
8. Lens
9. Lensboard
10. Lensboard control
11. Tapes
12. Timer
13. Vacuum pump

_____ a.

_____ b.

_____ c.

_____ d.

_____ e.

_____ f.

_____ g.

_____ h.

_____ i.

_____ j.

_____ k.

_____ l.

_____ m.

_____ n.

_____ o.

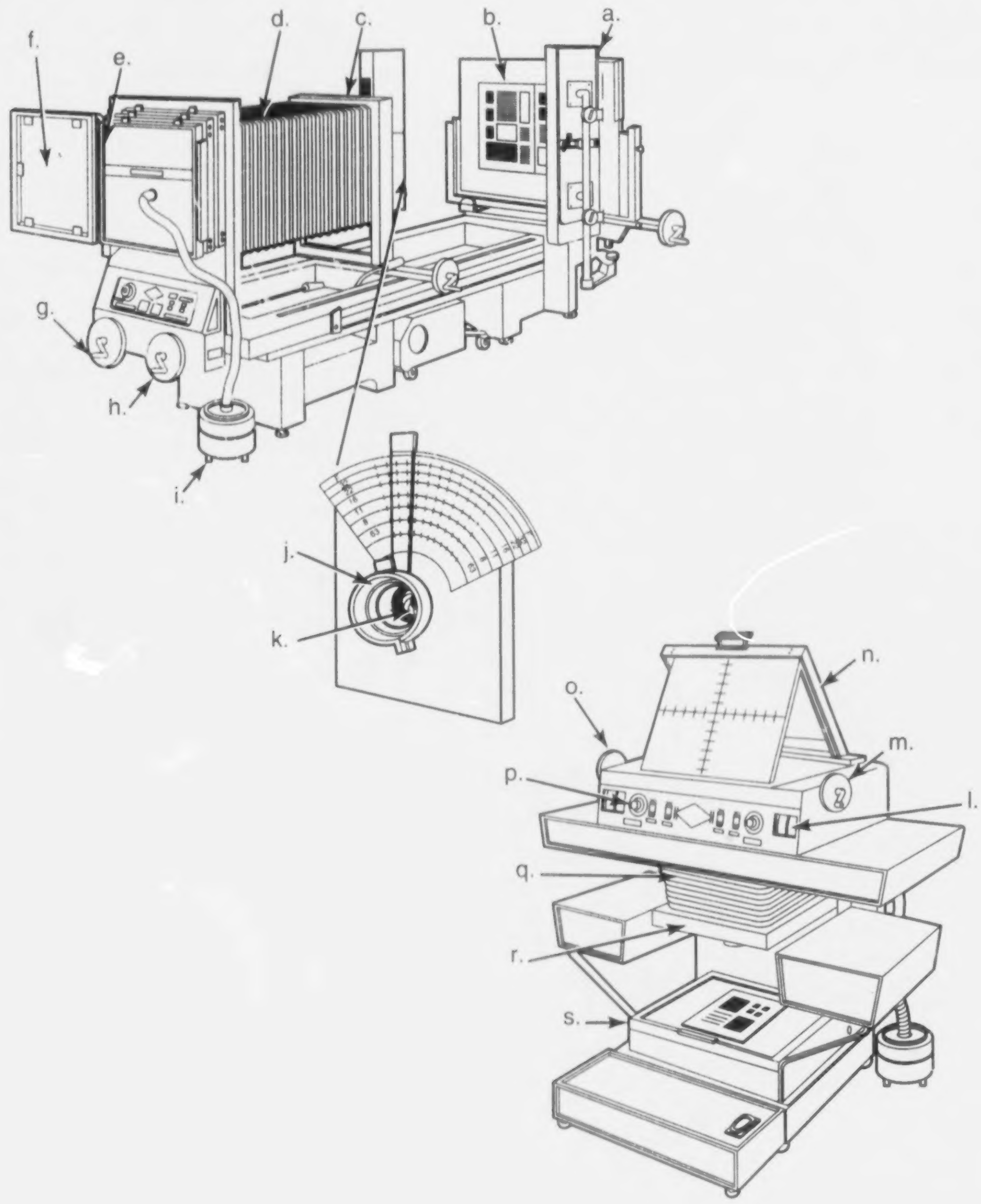
_____ p.

_____ q.

_____ r.

_____ s.

## Written Test


a.
b.
c.
d.
e.
f.
g.
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i.
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k.
l.
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n.
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q.
r.
s.

## Written Test

**Objective 3**

Match the parts of a process camera with their functions.

1. Bellows
2. Camera lights
3. Copyboard
4. Copyboard control
5. Diaphragm
6. Film back
7. Ground glass
8. Lens
9. Lensboard
10. Lensboard control
11. Shutter
12. Tapes
13. Timer
14. Vacuum pump

_____ a. A hinged gate that holds the film in place, usually by means of a vacuum

_____ b. Attached to the copyboard and used to illuminate copy

_____ c. A crank which changes the position of the lensboard for a correct size and properly focused image

_____ d. A flat surface used to hold copy, equipped with a hinged glass cover to hold copy in place

_____ e. Holds the lens, diaphragm, and shutter

_____ f. A light-tight, accordion-like chamber between the front case and camera back

_____ g. A piece of frosted glass that is positioned on the back of the camera to aid in focusing

_____ h. A vacuum device with the hose attached to the camera back

_____ i. A crank which changes the position of the copyboard for a correct size and properly focused image

_____ j. A timing device that is linked to the shutter

_____ k. A device that controls the duration of light striking the film

_____ l. A device that controls the quantity of light striking the film

_____ m. One or more pieces of optical glass designed to collect and focus rays of light to form a sharp image on film

_____ n. Two narrow strips of thin, flexible steel or plastic marked off in percentage units

## Written Test

**Objective 4**

Match the three types of camera copy with their descriptions.

1. Line
2. Halftone
3. Full color

_____ a. Black-and-white copy consisting of a single shade of black usually on a white background

_____ b. Illustrative material in original hues

_____ c. Black-and-white copy with intermediate shades of gray

**Objective 5**

Match darkroom equipment/supplies with their uses.

1. Automatic film processing
2. Camera film
3. Contact printing frame
4. Darkroom timer
5. Developer
6. Diffusion transfer processor
7. Film cutter
8. Film dryer
9. Fixer
10. Graduate
11. Light trap
12. Paper
13. Safelight
14. Stop bath
15. Temperature control sink
16. Thermometer
17. Tray processing
18. Viewing table

_____ a. A container used for mixing and measuring chemicals

_____ b. A weak solution of acetic acid, used in processing black-and-white film or paper; it stops development, prevents stains on paper, and makes the fixer last longer

_____ c. Used to indicate elapsed time during processing or to operate or control darkroom equipment

_____ d. A device used to measure the temperature of liquids

_____ e. An enclosed darkroom lamp fitted with a filter to screen out light rays to which film and paper are sensitive

_____ f. A photosensitive material consisting of a light sensitive emulsion, clear base material, and an antihalation coating

_____ g. A sensitized material with opaque base used for reproduction processes

_____ h. A solution used to turn the latent image into a visible image on exposed films or photographic paper

_____ i. A solution that removes any light-sensitive material not acted upon by light or developer, leaving a black-and-white negative or print that can no longer be affected by action of light

_____ j. A source of running water with a built-in unit that cools or heats the water to desired temperature

_____ k. Used to make same size reproduction from a negative or any other transparent or translucent material

_____ l. An instrument that supplies heat and air to speed drying time on films and papers

_____ m. Method of providing entrance and exit from a darkroom without allowing light to enter the darkroom; the most common type is the revolving door

_____ n. A device used to cut or trim large sheets of film or paper to desired size

_____ o. Mechanical device for processing of film using a developer, fixer, wash, and dryer

_____ p. A water-tight light table equipped with ortho safe and white light; may be used for film inspection during processing with ortho, or after processing with white light

_____ q. A device that contains an activator and is used primarily for processing diffusion transfer materials

_____ r. Hand method of processing film using three trays and a running water bath; the trays contain developer, stop bath, and fixer

**Objective 6**

Match the types of camera (graphic arts) film with their physical characteristics.

Note: Some characteristics apply to both types of film.

1. Rapid access    2. Lith

_____ a. Narrow exposure latitude

_____ b. Precise control required for development

_____ c. Fastest system for producing negatives

_____ d. High degree of latitude in processing

_____ e. Requires a one-part developer

_____ f. Requires a two-part developer

**Objective 7**

Select true statements concerning darkroom cleanliness by placing an "X" in the appropriate blanks.

_____ a. Mop floors frequently.

_____ b. Clean up spilled chemicals once a day.

_____ c. Store equipment on the floor.

_____ d. Keep all work surfaces clean.

## Written Test

**Objective 8**

Select true statements concerning darkroom safety by placing an "X" in the appropriate blanks.

_____ a. Know storage locations so that chemicals can be mixed under darkroom safelight conditions.

_____ b. When mixing chemicals always pour water into chemical.

_____ c. A person should always wash their hands after coming into contact with darkroom chemicals.

_____ d. Glass containers are preferable to plastic or steel for storing darkroom chemicals.

_____ e. Clean up any moisture on the floor or working surfaces immediately.

_____ f. Suggested personal protective devices for mixing chemicals would include goggles, rubber gloves, and an apron.

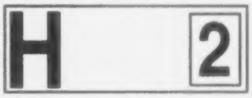
_____ g. Never handle electrical equipment with wet hands or when standing on a wet floor.

_____ h. Have an eyewash station conveniently located in the darkroom in the event chemicals accidentally get splashed into the eyes.

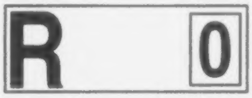
**Objective 9**

Interpret Hazardous Materials Identification System (HMIS) labels below by giving a brief interpretation for each label. Include the color designation for each label in your answers.

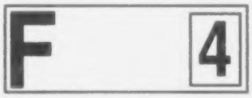
a.



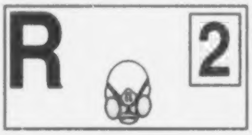
b.



c.



d.



*Permission to duplicate this test is granted.

## Unit 1

## The Process Camera and Darkroom Equipment

### Answers to Written Test

**Objective 1**

A large, sturdy camera used for photographing flat surfaces

**Objective 2**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a. | 2 | f. | 7 | k. | 5 | p. | 12 |
| b. | 3 | g. | 10 | l. | 11 | q. | 1 |
| c. | 9 | h. | 4 | m. | 10 | r. | 9 |
| d. | 1 | i. | 13 | n. | 7 | s. | 3 |
| e. | 6 | j. | 8 | o. | 4 | | |

**Objective 3**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a. | 6 | e. | 9 | i. | 4 | m. | 8 |
| b. | 2 | f. | 1 | j. | 13 | n | 12 |
| c. | 10 | g. | 7 | k. | 11 | | |
| d. | 3 | h. | 14 | l. | 5 | | |

**Objective 4**

| | |
|---|---|
| a. | 1 |
| b. | 3 |
| c. | 2 |

**Objective 5**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a. | 10 | f. | 2 | k. | 3 | p. | 18 |
| b. | 14 | g. | 12 | l. | 8 | q. | 6 |
| c. | 4 | h. | 5 | m. | 11 | r. | 17 |
| d. | 16 | i. | 9 | n. | 7 | | |
| e. | 13 | j. | 15 | o. | 1 | | |

**Objective 6**

| | | | |
|---|---|---|---|
| a. | 2 | d. | 1 |
| b. | 2 | e. | 1 |
| c. | 1 | f. | 2 |

**Objective 7**

a, d

**Objective 8**

c, e, f, g, h

**Objective 9**

a. Chemical is a moderate health hazard; color designation is blue.
b. Chemical is stable; a reactivity hazard; color designation is yellow.
c. Chemical is extremely flammable; color designation is red.
d. Violent chemical change may occur; color designation is yellow; respirator should be worn when working with chemical.

**Prerequisites:**
None

## Learning Activities Sheet

Student Name ____________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 4.

☐ 4. **Do** Assignment Sheet 1, "Collect Types of Copy."

☐ 5. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 6. If the evaluation is not satisfactory, repeat steps 3 and 4.

☐ 6. **Study** Information Sheet, Objectives 5 through 8.

☐ 7. **Do** Assignment Sheet 2, "Complete a Darkroom Safety Worksheet."

☐ 8. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 9. If the evaluation is not satisfactory, repeat steps 6 and 7.

☐ 9. **Study** Information Sheet, Objective 9.

**Optional**

☐ 10. **View** Videotape entitled "The OSHA Hazard Communication Standard for the Printing Industry." This video demonstrates the five requirements you must fulfill to comply with the OSHA Standard.

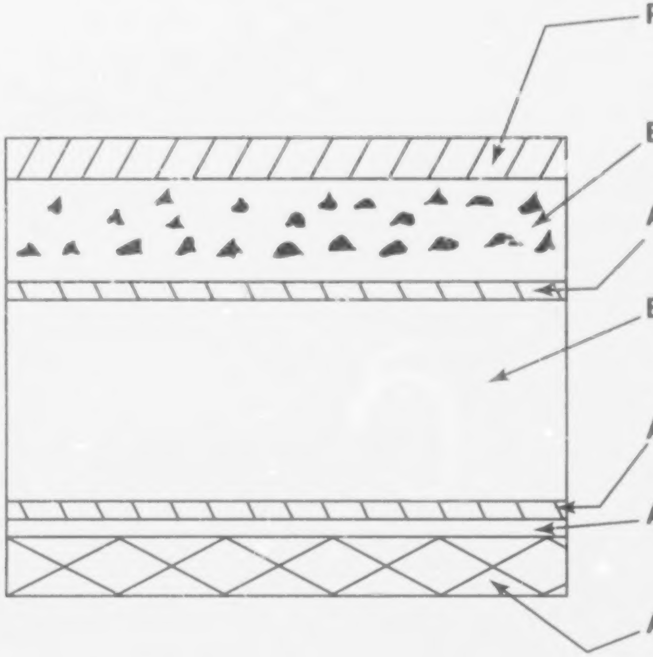
☐ 11. **Do** Assignment Sheet 3, "Compile Data on Chemical Hazards in the Darkroom."

## Learning Activities Sheet

| | | |
|---|---|---|
| ☐ 12. | **Stop** | Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 13. If the evaluation is not satisfactory, repeat steps 9 and 11. |
| ☐ 13. | **Observe** | Demonstration of procedure to be used in completing Job Sheet 1. |
| ☐ 14. | **Do** | Job Sheet 1, "Prepare a Darkroom for Tray Processing, and Expose and Develop a Line Negative." |
| ☐ 15. | **Stop** | Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 16. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 13 and 14. |
| ☐ 16. | **Check** | With instructor for any additional assignments to be completed. |
| ☐ 17. | **Do** | Additional assignment or job sheets listed below.<br>______________________________<br>______________________________<br>______________________________ |
| ☐ 18. | **Take** | Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations. |
| ☐ 19. | **Stop** | Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions. |

***Permission to duplicate this form is granted.**

# Schematic Cross Section of a Graphic Arts Camera Film



**Protective overcoat**—Reduces scratches during handling and processing

**Emulsion**—Light sensitive part of film

**Adhesive subcoat**—Used to adhere emulsion to the base

**Base**—Main support which gives film strength. Base material gives 70-85% of total film thickness

**Adhesive subcoat**—Same as above

**Anti-stat layer**—Minimizes static on film thereby reducing dust on film surface

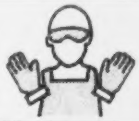
**Antihalation backing**—Prevents unwanted light from bouncing back through emulsion and causing a blurred image

**Note: Illustration above applies to both lith and rapid access types of camera film.**

# Hazardous Material Identification System (HMIS) Labeling

The illustration below shows typical examples of labels used for graphic arts chemicals and solvents. In addition to identifying the level of concern for the health, flammability and reactivity, please note all labels carry a symbol for personal protection recommended for personal safety when handling the particular product.

Some manufacturers use a simple black and white label as shown below. Other manufacturers choose to use a label with color coding.

| 0 - Minimal<br>1 - Slight<br>2 - Moderate<br>3 - Serious<br>4 - Severe | | Color Coding |
|---|---|---|
| H<br>Health | 0 | Blue |
| F<br>Flammability | 1 | Red |
| R<br>Reactivity | 0 | Yellow |
| Personal Protection |  | |

# Unit 2 Line Photography

## Unit Contents

**Teacher Components**

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Answers to Assignment Sheet . . . . . . . . . . . . 2–7

Written Test . . . . . . . . . . . . 2–9

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Student Page

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Assignment Sheet

- 1—Apply an Exposure Rule for Different Steps on the Gray Scale . . . . . . . . . . . . 2–13

Job Sheet

- 1—Set Up a Process Camera and Determine Exposures . . . . . . . 2–15

## Suggested Activities

Instructional Plan

### Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.

### Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss the assignment sheet. Review with students the criteria for evaluation of this activity.

# Suggested Activities

- Discuss and demonstrate the job sheet. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of this activity and the rating scale that will be used to indicate job performance.

Teaching Suggestions

- Provide students with problems to help them correctly identify various types of copy and how to determine appropriate exposure for each type.
- Provide students with problems dealing with enlargement and reduction.
- Use the job sheet to illustrate use of filters, reductions, enlargements, and problem copy.
- Have students review Unit 1 to prepare a darkroom for tray processing (if needed).

## Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.
- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.
- Evaluate the assignment sheet. Rate the student using the criteria listed on each assignment sheet. See Answers to Assignment Sheet for correct answers where applicable. If the student's performance is unacceptable, have the student review the appropriate materials and complete the assignment again.
- Evaluate the job sheet. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

## Suggested Activities

Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

**Sample A**

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

**Sample B**

**Yes**—Can perform job with no additional training.
**No**—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

### Resources Used in Developing This Unit

**Print Media**

- Cogoli, John E. *Photo-Offset Fundamentals.* Old Tappan, NJ: Macmillan Publishing Co., 1986.
- Destree, Thomas M. *The Lithographer's Manual.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.
- Koonce, John W. *Graphic Arts Photography: An Individualized Approach.* Emporia, KS: Emporia State University Press.

## Answers to Assignment Sheet

**Assignment Sheet 1**

**Apply an Exposure Rule for Different Steps on the Gray Scale**

A. 6, 8, 12, 16, 24, 32, 48, 64

B. 7.5, 10, 15, 20, 30, 40, 60, 80

## Written Test

Name ______________________________

Date ______________________ Score __________

**Objective 1**

Match the terms with their definitions. Definitions continue on the next page.

1. Color copy
2. Densitometer
3. Density
4. Emulsion
5. Filter
6. Filter factor
7. *F*/stop
8. Line copy
9. Normal copy
10. Photo factor
11. Reflection gray scale
12. Resolving power
13. Running water bath
14. Unusual copy
15. White light

_____ a. Any image composed of solid dark areas against a white background

_____ b. Electromagnetic radiation having different wave lengths that produce different colors, such as red, green and blue

_____ c. Copy with a good dense black image and a white background

_____ d. Lightness or darkness of a particular piece of copy

_____ e. Commercially-produced strip of photographic paper stepped in increasing density values of .15 for each step

_____ f. Instrument for reading photographic densities

_____ g. Ability of a lens or film emulsion to record fine detail

_____ h. Light-sensitive coating on photographic materials

_____ i. States that every exposure increase of .30 density requires a 2X exposure factor

_____ j. Copy where the background and/or image is in a color other than black

_____ k. Colored device made commonly of gelatin or glass; placed in front of the lens to reduce or eliminate light of certain colors and allow the light of other colors to pass through onto the film for exposure

_____ l. A number multiplied by the normal exposure to achieve the necessary exposure increase when using a filter

_____ m. The diameter of the lens opening

_____ n. Removes residual effects of film processing chemicals; makes the film more permanent

_____ o. Copy that fits either extreme; extra heavy, light or extra light

**Objective 2**

Complete the following statements concerning principles of line photography by filling in the blanks with the appropriate word(s).

a. Light rays travel in a ____________________ line as they are projected through the lens of a camera.

b. An image must be placed in the copyboard ________________________ in order to be viewed right when reading from the ground glass.

c. When camera lights illuminate the copy in the copyboard, light copy areas __________________ light and dark copy areas absorb light.

d. The reflected portion of the light passes through the lens and exposes the emulsion of the film creating a ____________________.

e. The ____________________ copy area does not record an exposure on the film, thus the image area shows up clear on the developed film.

**Objective 3**

Distinguish between the types of film base material by placing an "N" next to the descriptions of a nonstable base and a "D" next to the descriptions of a dimensionally stable base.

_____ a. Plastic or acetate

_____ b. Polyester

_____ c. Used for most line work

_____ d. Used for work that requires precise image stability

**Objective 4**

Match the types of emulsion with their descriptions.

1. Panchromatic
2. Orthochromatic
3. Blue-sensitive

_____ a. Film sees all colors except red

_____ b. Film sees all colors to include red

_____ c. Film sees only blue

**Objective 5**

Describe the following degrees of density.

a. Opaque–______________________________

b. Translucent–______________________________

c. Transparent–______________________________

**Objective 6**

State an exposure rule for recording density steps on a gray scale.

______________________________

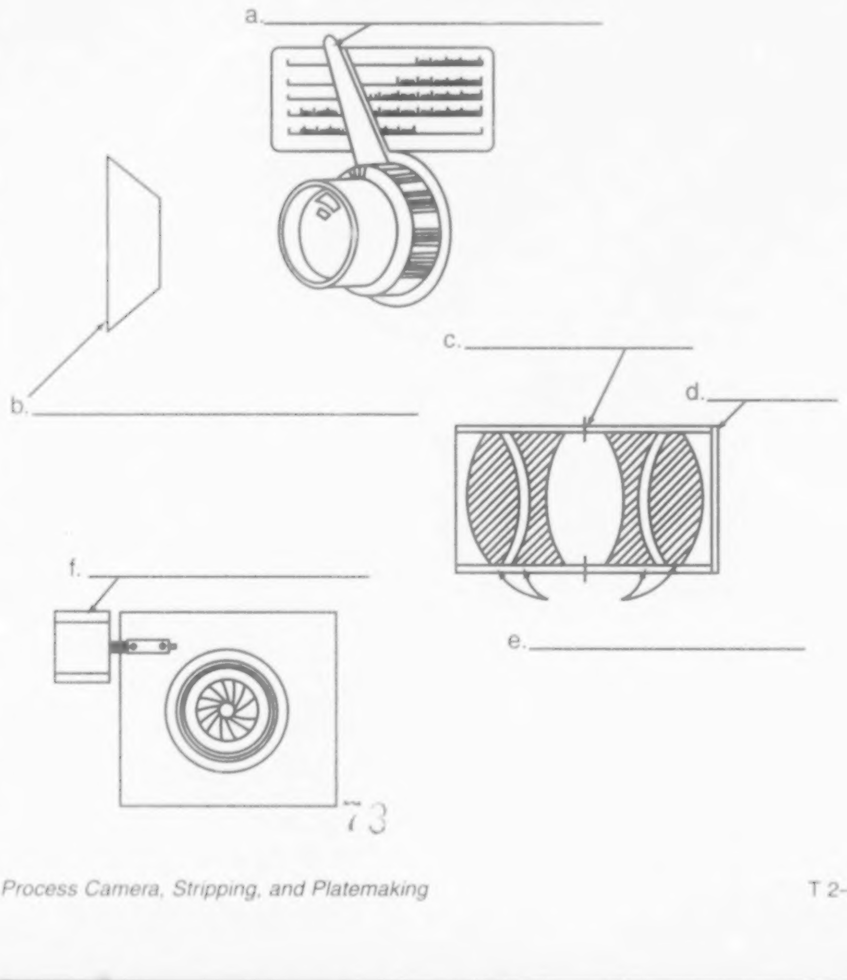
______________________________

______________________________

______________________________

**Objective 7**

Identify the parts of a typical lens assembly by writing the correct names in the blanks in the following illustrations.



## Written Test

**Objective 8**

Select true statements concerning the characteristics of an aperture by placing an "X" in the appropriate blanks.

_____ a. The aperture is located inside lens barrel.

_____ b. The aperture is made up of several metal blades that form a circular opening.

_____ c. A change in an *f*/stop number will not affect the aperture.

_____ d. A change in an *f*/stop number will change the aperture.

_____ e. The aperture does not affect the quantity of light striking the film.

**Objective 9**

Select true statements concerning the functions of filters by placing an "X" in the appropriate blanks.

_____ a. Filters are used to drop color and therefore photograph as black.

_____ b. Filters are used to hold color and therefore photograph as white.

_____ c. Filters are used to drop color and therefore photograph as white.

_____ d. Filters are used to hold color and therefore photograph as black.

***Permission to duplicate this test is granted.**

## Answers to Written Test

**Objective 1**

| | | | | | |
|---|---|---|---|---|---|
| a. | 8 | f. | 2 | k. | 5 |
| b. | 15 | g. | 12 | l. | 6 |
| c. | 9 | h. | 4 | m. | 7 |
| d. | 3 | i. | 10 | n. | 13 |
| e. | 11 | j. | 1 | o. | 14 |

**Objective 2**

a. Straight
b. Upside down
c. Reflect
d. Latent image
e. Dark

**Objective 3**

a. N
b. D
c. N
d. D

**Objective 4**

a. 2
b. 1
c. 3

**Objective 5**

a. Blocks out all light
b. Blocks out only a portion of the light
c. Allows almost all light to pass through

**Objective 6**

Every change in density of .30 requires either twice or half as much exposure.

**Objective 7**

a. *F*/stop adjustment lever
b. Lens shade and filter holder
c. Aperture
d. Shutter
e. Lens elements
f. Electric solenoid

**Objective 8**

a, b, d

**Objective 9**

c, d

**Prerequisites:**
**None**

## Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 6.

☐ 4. **Do** Assignment Sheet 1, "Apply an Exposure Rule for Different Steps on the Gray Scale."

☐ 5. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 6. If the evaluation is not satisfactory, review Objective 6 and repeat step 4.

☐ 6. **Study** Information Sheet, Objectives 7 through 9.

☐ 7. **Observe** Demonstration of procedure to be used in completing Job Sheet 1.

☐ 8. **Do** Job Sheet 1, "Set Up a Process Camera and Determine Exposures."

☐ 9. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 10. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 6 through 8.

☐ 10. **Check** With instructor for any additional assignments to be completed.

## Learning Activities Sheet

☐ 11. **Do** Additional assignments listed below.

____________________________________________

____________________________________________

____________________________________________

☐ 12. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 13. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

***Permission to duplicate this form is granted.**

## Unit Contents

Teacher Page

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Student Page

**Student Components**

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  1—Program a Q15 Exposure Computer and Make a Halftone Negative .......... 3–13
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  3—Make a Fake Duotone .......... 3–25
  4—Rescreen a Halftone Illustration .......... 3–29

## Suggested Activities

**Instructional Plan**

### Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make a transparency from the transparency master included in this unit. This appears in the teacher edition only.

### Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss the assignment sheet. Review with students the criteria for evaluation of this activity.

## Suggested Activities

- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

### Teaching Suggestions

- Through outside sources of printed examples such as newspapers and magazines, have students collect examples of good quality and poor quality halftones. Discuss them in class and make students aware of criteria for quality halftone reproduction.

- Utilize available resources to make students aware of computerized halftone exposure systems; i.e., Carlson Sharpshooter, Kodak Q700, Macbeth exposure controller, Gamm System, etc.

- Although this unit of instruction deals with production of halftone negatives, make students aware of halftone procedures using diffusion transfer procedures.

### Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.

- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.

- Evaluate the assignment sheet. Rate the student using the criteria listed on each assignment sheet. See Answers to Assignment Sheet for correct answers where applicable. If the student's performance is unacceptable, have the student review the appropriate materials and complete the assignment again.

- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

## Suggested Activities

Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

**Sample A**

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

**Sample B**

**Yes**—Can perform job with no additional training.
**No**—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

## Resources Used in Developing This Unit

### Print Media

- Cogoli, John E. *Photo-Offset Fundamentals.* Old Tappan, NJ: Macmillan Publishing Co., 1986.
- Destree, Thomas M. *The Lithographer's Manual.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.
- Koonce, John W. *Graphic Arts Photography: An Individualized Approach.* Emporia, KS: Emporia State University Press.

## Written Test

Name ____________________________________________

Date ______________________________ Score__________

Objective 1

Match the terms with their definitions. Definitions continue on the next page.

1. Contact screen
2. Densitometer
3. Density
4. Duotone
5. Fake duotone
6. Flash exposure
7. Halftone
8. Halftone dot
9. Halftone screen
10. Main exposure
11. Moire
12. Neutral density filter
13. No-screen exposure
14. Rescreening
15. Screen ruling

_____ a. A converted image of a continuous tone copy that consists of solid dots of equal density but varying sizes

_____ b. Used in the light path between the lens and film to break the continuous tone copy into a dot pattern for reproduction

_____ c. A precision pattern of vignetted dots on a flexible base material used in direct contact with the film

_____ d. The number of lines per inch on a halftone screen

_____ e. A numerical measure of the blackening or light-stopping ability of a photographic image

_____ f. An instrument for making density measurements

_____ g. A detail exposure made through the lens of the camera, with the contract screen in place with only the camera lights

_____ h. A nonimage exposure made through the contact screen to the film; used to increase dot size in the shadow area of the halftone

_____ i. An exposure made by exposing the film to the copy without the contact screen

_____ j. A gray-colored filter used to uniformly reduce all colors of light

_____ k. A two-impression reproduction using two halftones of the same original

_____ l. A two-impression reproduction, with a halftone which is overprinted on a color block

_____ m. An individual dot of printed ink; groups of dots represent percentage of ink coverage on the printed sheet

_____ n. An objectionable wavy effect produced when screens are overprinted at an incorrect angle

_____ o. Screening of a printed halftone illustration

**Objective 2**

Match the types of contact screens with their descriptions.

1. Conventional dot screen
2. Elliptical dot screen
3. Gray contact screen
4. Magenta contact screen

_____ a. A dyed screen whose tone reproduction characteristics can be altered with the use of magenta and yellow filters

_____ b. A screen that produces square middletone dots that join all four corners as the dots reach 50 percent

_____ c. A screen that produces football-shaped middletone dots that join only two opposite corners as the dots reach 50 percent

_____ d. A silver emulsion screen that does not require magenta color for control of tone reproduction

**Objective 3**

Select true statements concerning the care of contact screens by placing an "X" in the appropriate blanks.

_____ a. Clean water spots only with blanket wash.

_____ b. Dust the screen by wiping it with a clean shop towel.

_____ c. Keep the screen flat and in its original folder when not in use.

_____ d. Protect from dirt, dust, fingerprints, scratches, and other damage.

**Objective 4**

Complete the following statements concerning halftone dot percentages by filling in the blanks with the appropriate word(s).

a. Halftone dots are described in terms of ____________________ of ink coverage on the printed page.

b. Dot percentages as they appear on the printed page are exactly opposite of how they appear on the ____________________.

c. The highlight area of a halftone typically prints 10 percent ink coverage with 90 percent white ____________________ from the page, thus the eye sees primarily white.

d. The ____________________ areas appear to be gray because the 50 percent ink coverage and 50 percent white reflected from the page are blended by the eye.

e. The shadow area of a halftone typically prints 90 percent ink coverage with only 10 percent white reflected from the page, thus the eye sees primarily

____________________ in the shadow area of a printed halftone.

Objective 5

Select true statements concerning procedures for avoiding moires in rescreening by placing an "X" in the appropriate blanks.

_____ a. Use a screen which has a screen ruling that is the same as the copy.

_____ b. The original may be greatly enlarged.

_____ c. Hold a clean piece of glass in front of the lens, and tilt it back and forth during exposure.

_____ d. Angle the contact screen or copy 30 degrees.

_____ e. Halftone dots may be thrown out of focus slightly.

*Permission to duplicate this test is granted.

## Answers to Written Test

**Objective 1**

a. 7
b. 9
c. 1
d. 15
e. 3
f. 2
g. 10
h. 6
i. 13
j. 12
k. 4
l. 5
m. 8
n. 11
o. 14

**Objective 2**

a. 4
b. 1
c. 2
d. 3

**Objective 3**

c, d

**Objective 4**

a. Percentage
b. Halftone negative
c. Reflected
d. Middletone
e. Black

**Objective 5**

c, d, e

# Unit 3 Halftone Photography

**Prerequisites:**
**None**

## Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 4.

☐ 4. **Do** Assignment Sheet 1, "Identify Halftone Dot Percentages."

☐ 5. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 6. If the evaluation is not satisfactory, review Objective 4 and repeat step 4.

☐ 6. **Observe** Demonstration of procedures to be used in completing Job Sheets 1 through 3.

☐ 7. **Do** **Job Sheet 1**, "Program a Q15 Exposure Computer and Make a Halftone Negative;" **Job Sheet 2**, "Make a Duotone;" and **Job Sheet 3**, "Make a Fake Duotone."

☐ 8. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 1 through 3, continue to step 9.

☐ 9. **Study** Information Sheet, Objective 5.

☐ 10. **Observe** Demonstration of procedure to be used in completing Job Sheet 4.

☐ 11. **Do** Job Sheet 4, "Rescreen a Halftone Illustration."

## Learning Activities Sheet

☐ 12. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 14. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 4 and repeat steps 9 through 11.

☐ 13. **Check** With instructor for any additional assignments to be completed.

☐ 14. **Do** Additional assignments listed below.

☐ 15. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

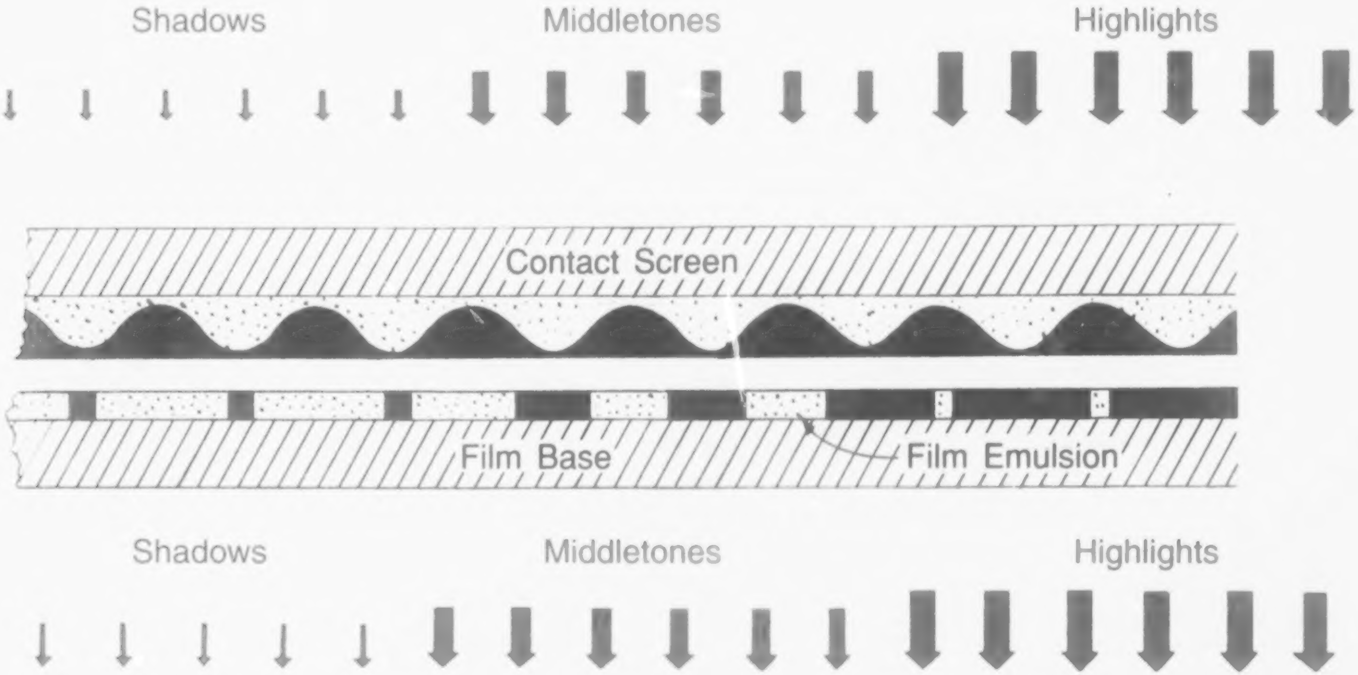
☐ 16. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

*Permission to duplicate this form is granted.

MAVCC—*Graphic Arts: Process Camera, Stripping, and Platemaking*

# Contact Screen Exposure

Light striking film through a contact screen must penetrate varying density in the form of a dot pattern on the screen in order to reach and expose the film. Intense light from highlight areas in the original penetrates even dense areas on the screen and exposes a large dot pattern on the film. The slight amount of light coming from dark areas, on the other hand, yields only small dots.


Shadows
Middletones
Highlights
Contact Screen
Film Base
Film Emulsion
Shadows
Middletones
Highlights

Courtesy of Eastman Kodak Company

TM 1
T 3-15

# Unit 4

# Other Darkroom Techniques

## Unit Contents

**Teacher Components**

Teacher Page

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1—Determine Basic Exposure and Make a Diffusion Transfer Line Print . . . . . . . . . . 4–9
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## Suggested Activities

**Instructional Plan**

### Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.

### Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

## Suggested Activities

Teaching Suggestions

Note: Many school shops are no longer equipped with diffusion transfer processors. This material may not be applicable to those programs. To others, however, the activities will provide excellent hands-on training in darkroom technique.

- Demonstrate procedures for making a step-off test to determine a basic exposure when using the contact frame/platemaker.
- If possible, demonstrate to the students both darkroom films and paper, and roomlight films and paper when used in a contact environment.
- Give students exposure to as many different diffusion transfer products as possible, i.e., image reversal material, receiver film and plate material.

### Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.
- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.
- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

## Suggested Activities

Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

**Sample A**

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

**Sample B**

**Yes**—Can perform job with no additional training.
**No**—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

## Resources Used in Developing This Unit

### Print Media

- Cozart, Jerome X. *Basic Film Contacting*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1980.
- Cozart, Jerome X. *Contacting (Spreads & Chokes)*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1980.
- Knittel, Patricia A. *Creating Special Effects With Posterization*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1980.
- Schneider, Robert J. *Diffusion Transfer*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1988.

## Written Test

Name ______________________________

Date ______________________ Score __________

**Objective 1**

Match the terms with their definitions. Definitions continue on the next page.

1. Activator
2. Choke
3. Color key proofing material
4. Combination print
5. Contact film
6. Copy dot
7. Diffusion transfer
8. Diffusion transfer negative paper
9. Diffusion transfer receiver paper
10. Diffusion transfer transparent receiver sheet
11. Duplicating film
12. PMT
13. Posterizing
14. Special effects screen
15. Spread
16. Three-color posterization
17. Three-tone posterization
18. Two-tone posterization

_____ a. A photographic process characterized by exposing a sheet of sensitized paper, processing the paper in contact with a receiver sheet, and peeling the two apart after a short waiting period to produce a usable image on the receiver

_____ b. Trade name of diffusion transfer material marketed by the Eastman Kodak Company

_____ c. A light-sensitive camera speed paper designed for use in a process camera

_____ d. A non-light-sensitive, but chemically sensitive paper that accepts the transferred image as a positive print

_____ e. A non-light-sensitive, but chemically sensitive material with a transparent base

_____ f. A one-step, ready-to-use processing chemical used in a diffusion transfer processor

_____ g. Making a line negative of a screened halftone illustration

_____ h. The practice of compressing a full range of tones in a picture into a few flat tones

_____ i. A contact speed, thin base film used to make duplicates of an original negative or positive

_____ j. A contact speed, thin base film used to make a film positive from a film negative

_____ k. A contact process by which normal line images are made fatter without altering their shape or location; made from film negatives

_____ l. A contact process by which normal line images are made thinner without altering their shape or position; made from film positives

_____ m. A screen used to generate different patterns or textures within the photo reproduction

_____ n. Material used to provide a color proof

_____ o. Posterization made using three film negatives, each one made at a different exposure

_____ p. A halftone combined with reverse lettering

_____ q. Tones of a photograph are reduced to a black-and-white illustration

_____ r. Tones of photograph are reproduced as black-and-white with screened middletone area

**Objective 2**

Select true statements concerning the care of a diffusion transfer processor by placing an "X" in the appropriate blanks.

_____ a. Clean processor once a month.

_____ b. Remove and wash the tray with warm water.

_____ c. Clean the processor rollers.

_____ d. Dry and reassemble the processor.

_____ e. Drain and discard activator daily.

**Objective 3**

List the materials and equipment necessary to make a diffusion transfer print.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

*Permission to duplicate this test is granted.

## Answers to Written Test

**Objective 1**

| | | | | | |
|---|---|---|---|---|---|
| a. | 7 | g. | 6 | m. | 14 |
| b. | 12 | h. | 13 | n. | 3 |
| c. | 8 | i. | 11 | o. | 16 |
| d. | 9 | j. | 5 | p. | 4 |
| e. | 10 | k. | 15 | q. | 18 |
| f. | 1 | l. | 2 | r. | 17 |

**Objective 2**

b, c, d

**Objective 3**

The following answers may appear in any order.

a. Diffusion transfer negative paper
b. Diffusion transfer receiver paper
c. Activator
d. Camera
e. Processor

**Prerequisites:**
**None**

## Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 3.

☐ 4. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 5. **Do** Job Sheet 1, "Determine Basic Exposure and Make a Diffusion Transfer Line Print."

☐ 6. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 7. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 4 and 5.

☐ 7. **Observe** Demonstration of procedures to be used in completing Job Sheet 2.

☐ 8. **Do** Job Sheet 2, "Program a Q15 Exposure Computer and Make a Diffusion Transfer Halftone Print."

☐ 9. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 10. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 2 and repeat steps 7 and 8.

☐ 10. **Observe** Demonstration of procedures to be used in completing Job Sheets 3 and 4.

☐ 11. **Do** Job Sheet 3, "Make a Two-Tone Posterization Using Diffusion Transfer Material" and Job Sheet 4, "Make a Three-Tone Posterization Using Special Effects Screen and Diffusion Transfer Material."

☐ 12. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 3 and 4, continue to step 13.

☐ 13. **Observe** Demonstration of procedures to be used in completing Job Sheet 5.

☐ 14. **Do** Job Sheet 5, "Make a Three-Color Posterization Using Graphic Arts Film."

☐ 15. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 16. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 5 and repeat steps 13 and 14.

☐ 16. **Observe** Demonstration of procedures to be used in completing Job Sheets 6 and 7.

☐ 17. **Do** Job Sheet 6, "Make a Duplicate Negative and a Film Positive Using Graphic Arts Film" and Job Sheet 7, "Make a Spread and Choke Using Graphic Arts Film."

☐ 18. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 6 and 7, continue to step 19.

☐ 19. **Observe** Demonstration of procedures to be used in completing Job Sheet 8.

☐ 20. **Do** Job Sheet 8, "Make a Combination Print With Reversed Type Overprinted in a Second Color."

☐ 21. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 22. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 8 and repeat steps 19 and 20.

☐ 22. **Check** With instructor for any additional assignments to be completed.

☐ 23. **Do** Additional assignments listed below.

________________________________________

________________________________________

________________________________________

☐ 24. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 25. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

***Permission to duplicate this form is granted.**

# Unit 5 Overview of Process Color Photography

## Unit Contents

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Written Test . . . . . 5–7

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Learning Activities Sheet . . . . . 5–11

**Student Components**

Student Page

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Student Supplement

- 1—Direct Screen Separation Record . . . . . 5–11

Job Sheets

- 1—Make a Set of Unmasked Direct Screen Four-Color Separation Negatives . . . . . 5–13
- 2—Make an Acetate Overlay Proof . . . . . 5–19

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## Suggested Activities

**Instructional Plan**

### Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.

### Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

## Suggested Activities

Teaching Suggestions

- Visit a local printing facility that is involved in four-color reproduction.
- Make sure students develop an understanding of the differences between a typical printing operation that purchases separations for printing and a trade shop which specializes primarily in making only the separation negatives for the printing process.
- Work with the students on exposure ratios; i.e., if a trial exposure for cyan is 30 seconds and a trial exposure for magenta is 70 seconds, assume that after making a cyan separation the correct exposure was 40 seconds, the following ratio may be used to determine the actual magenta exposure.

$$\frac{\text{original cyan}}{\text{original magenta}} \quad \mathrm{x} \quad \frac{\text{new cyan}}{\text{unknown magenta}}$$

Substitute exposure numbers for the words as given in the basic formula.

The formula would now look like the following.

$$\frac{\text{30 seconds}}{\text{70 seconds}} \quad \mathrm{x} \quad \frac{\text{40 seconds}}{X}$$

The X factor represents the new unknown magenta exposure.

Cross multiply.

$30X = 2800$

$X = 93\ ^{1}/_{3}$ seconds

The new magenta exposure would then be 93 $^{1}/_{3}$ seconds.

Other exposures may be determined in like manner by comparing the cyan exposure to the yellow and black accordingly.

Note that due to differences in cameras, lighting systems, etc., an exposure device such as the Kodak direct screen calculator will be needed to fine tune the exposure system.

## Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.
- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.
- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

  Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

  **Sample A**

  4—**Skilled**—Can perform job with no additional training.
  3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
  2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
  1—**Unskilled**—Is familiar with process, but is unable to perform job.
  0—**No exposure**—No information or practice provided during training program.

  **Sample B**

  **Yes**—Can perform job with no additional training.
  **No**—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

## Suggested Activities

### Resources Used in Developing This Unit

#### Print Media

- Eastman Kodak. *Basic Color for the Graphic Arts*. Rochester, NY: Eastman Kodak Co., 1986.
- Eastman Kodak. *Direct Screen Calculator Q-10B*. Rochester, NY: Eastman Kodak Co., 1975.
- Graphic Arts Technical Foundation. *Color and Its Reproduction*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1988.

## Written Test

Name ____________________

Date ____________________ Score __________

**Objective 1**

Match the terms with their definitions.

1. Acetate proofing system
2. Code notch
3. Color correction
4. Color separation
5. Complementary color
6. Cyan
7. Magenta
8. Mask
9. Moire
10. Neutral density filter (ND)
11. Panchromatic film
12. Primary colors
13. Scanner
14. Separation negative

_____ a. A process of separating the color original into three black-and-white negatives

_____ b. The process of compensating for ink deficiencies in making separation negatives

_____ c. One or more notches on one corner of a sheet of film used to identify the emulsion and emulsion side of the film

_____ d. The color that is opposite another color on a color wheel

_____ e. A grey-colored filter used to add density with no change in color

_____ f. A dark pink color that is used in color separation and color printing

_____ g. Colors which cannot be produced by mixing other colors

_____ h. An undesirable pattern on a halftone negative created by the improper angling of the contact screen

_____ i. A blue-green color that is used in color separation and color printing

_____ j. Film that is sensitive to all colors of light

_____ k. A black-and-white photographic image of a color original used for color correction

_____ l. The negative that represents one of the primary colors from a color original

_____ m. A system used to proof separation negatives

_____ n. Device that converts an image such as line art or photos to digital data usable by the computer

## Written Test

**Objective 2**

Distinguish between additive and subtractive primary colors by placing an "A" before descriptions of additive primary colors and an "S" before descriptions of subtractive primary colors.

_____ a. These primary colors are blue, green, and red.

_____ b. These primary colors are cyan, magenta, and yellow.

_____ c. When these colors are mixed together in various proportions, they produce a full range of colors.

_____ d. These are also called process colors.

_____ e. When these colors are added together, they form white light.

**Objective 3**

Select true statements concerning the functions of printing inks by placing an "X" in the appropriate blanks.

_____ a. One function of ink is to control the light that is permitted to strike the paper and to be reflected from it.

_____ b. Magenta ink absorbs the blue part of white light.

_____ c. Yellow ink absorbs the green part of white light.

_____ d. Cyan ink absorbs the red part of white light.

_____ e. Black ink absorbs all components of white light.

**Objective 4**

Select true statements concerning color separation by placing an "X" in the appropriate blanks.

_____ a. Three plates are used for printing three colored inks.

_____ b. The yellow printer separation negative is made by exposing through a blue filter.

_____ c. The magenta printer separation negative is made by exposing through a red filter.

_____ d. The cyan printer separation negative is made by exposing through a green filter.

_____ e. Three separate negatives are needed for color separation, each one representing one of the primary colors.

**Objective 5**

Name the methods for making color corrections.

a. ____________________________________________

b. ____________________________________________

c. ____________________________________________

*Permission to duplicate this test is granted.

## Answers to Written Test

**Objective 1**

a. 4
b. 3
c. 2
d. 5
e. 10
f. 7
g. 12
h. 9
i. 6
j. 11
k. 8
l. 14
m. 1
n. 13

**Objective 2**

a. A
b. S
c. S
d. S
e. A

**Objective 3**

a, d, e

**Objective 4**

a, b, e

**Objective 5**

a. Photographic masking
b. Electronic scanning
c. Localized dot etching

**Prerequisites:**
**None**

## Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 5, and Student Supplement 1, "Direct Screen Separation Record."

☐ 4. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 5. **Do** Job Sheet 1, "Make a Set of Unmasked Direct Screen Four-Color Separation Negatives" and complete Student Supplement 1.

☐ 6. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 7. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 4 and 5.

☐ 7. **Observe** Demonstration of procedures to be used in completing Job Sheet 2.

☐ 8. **Do** Job Sheet 2, "Make an Acetate Overlay Proof."

☐ 9. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 10. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 2 and repeat steps 7 and 8.

☐ 10. **Check** With instructor for any additional assignments to be completed.

## Learning Activities Sheet

☐ 11. **Do** Additional assignments listed below.

________________________________________

________________________________________

________________________________________

☐ 12. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 13. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

*Permission to duplicate this form is granted.

## Unit Contents

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Answers to Written Test . . . . . 6–13
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**Student Components**

**Student Page**

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Job Sheets

1—Establish True Edge and Vertical Alignment on a Stripping Table (Square Up) . . . . . 6–13
2—Strip a Ruled Flat (Right-Reading) . . . . . 6–17
3—Lay Out and Strip an Unruled Flat (Wrong-Reading) . . . . . 6–21
4—Strip a Flat for Single Color Envelopes . . . . . 6–27
5—Strip a Flat for Single Color Work and Turn Imposition . . . . . 6–29
6—Strip a Flat for Single Color Work and Tumble Imposition . . . . . 6–33
7—Strip for Step-and-Repeat . . . . . 6–37
8—Strip a Single Color Flat for a 4-Page Signature . . . . . 6–39
9—Lay Out Signature Flats and Strip a Single Color Flat for an 8-Page Signature . . . . . 6–43
10—Strip a Single Color Step-and-Repeat Using Pin Register . . . . . 6–49
11—Combine Line and Halftone Work . . . . . 6–59
12—Strip for Combination Print (Double Burn With Screen Tint) . . . . . 6–61
13—Strip Complementary Flats for Multi-Color Printing . . . . . 6–63
14—Lay Out Signature Flats for a 16-Page Signature . . . . . 6–65
15—Strip a Two-Color Job Using Pin Register and Masking Film . . . . . 6–69
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17—Expose a Blueline or Daylight Copy Proof . . . . . 6–75

## Suggested Activities

**Instructional Plan**

### Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resources" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.

### Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

## Suggested Activities

Teaching Suggestions

- Help students develop an understanding of different bend and gripper lines as they relate to different presses and the importance of knowing press specifications to determine accurate stripping procedures for each press.
- Discuss different types of imposition that are used to lay out and prepare printed material.
- If possible, plan a field trip to a nearby printing company where students may have the opportunity to see step-and-repeat equipment as well as electronic stripping devices in operation.

### Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.
- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.
- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

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  Two sample performance evaluation keys have been provided below and on the following page. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

**Sample A**

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

**Sample B**

**Yes**—Can perform job with no additional training.
**No**—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

## Resources Used in Developing This Unit

### Print Media

- Cogoli, John E. *Photo-Offset Fundamentals.* Old Tappan, NJ: Macmillan Publishing Company, 1986.
- Dennis, Ervin A., and John D. Jenkins. *Comprehensive Graphic Arts.* 3rd ed. New York: Glencoe/McGraw-Hill, 1991.
- Destree, Thomas M. *The Lithographers Manual.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.
- Peck, Harold L. *Stripping: The Assembly of Film Images.* 2nd ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1988.

## Suggested Supplemental Resources

### Electronic Media

- Film Assembly Video Training Series

  This series includes the following three videos:

  - *Basic Stripping Procedures and Techniques*
  - *One Color Multi-Flat Stripping*
  - *Nonprocess Multi-Color Stripping*

  These videos are available from:

  Montage Productions
  1085 Tunnel Road #2
  Asheville, NC 28805
  Sales office: 800-366-3714
  www.montagepro.com

## Written Test

Name ______________________________________________

Date ______________________________ Score __________

**Objective 1**

Match the terms with their definitions. Definitions continue on the next page.

1. Combination printing
2. Complementary flat
3. Double burn
4. Emulsion side
5. Flat
6. Goldenrod
7. Imposition guide
8. Lithographer's tape
9. Main flat
10. Masking sheet
11. Opaque
12. Pinholes
13. Pin register
14. Register
15. Register marks
16. Rule
17. Signatures
18. Step-and-repeat
19. Stripping
20. Windows

_____ a. The process of fastening negatives to masking sheets to produce a flat

_____ b. Negative or negatives attached to masking sheet from which the offset plate is made

_____ c. Special opaque paper or plastic sheet used to make the flat

_____ d. Openings in the masking sheet that expose image areas onto the offset plate

_____ e. Another name for masking paper; yellow or orange in color

_____ f. To prevent light from passing through a material

_____ g. The side of the film coated with light-sensitive material

_____ h. Small clear areas in the negative which would allow light to pass through if not detected and opaqued

_____ i. Red tape; opaque in nature

_____ j. A line scribed or scratched on a negative

_____ k. The process of repeating the exposure of a flat several times on an offset plate

_____ l. To print the image in the exact same position on each sheet of paper

_____ m. Small crosses, guides, or patterns placed on originals and flats to aid registration

_____ n. Flat containing the key negatives of a multi-color job

_____ o. A flat containing negatives for only one color or part of a multi-color job

_____ p. Printing line copy on top of a halftone

_____ q. Usually two, four, eight, or sixteen pages printed on a single sheet to be folded and trimmed as a book or part of a book

_____ r. A sheet marked to show the page positions

_____ s. Accurate system of registration using punched negatives, flats, plates, and positioned register pins

_____ t. Exposing a plate twice using two complementary flats

**Objective 2**

Match the stripping tools and materials with their proper uses.

1. Goldenrod
2. Light table
3. Line-up table
4. Lithographer's tape
5. Magnifier
6. Masking tape
7. Opaque brush or pen
8. Opaque solution
9. Register pins and punches
10. Rubylith or amberlith
11. Scissors
12. Scribing tool
13. Straight-edge ruler
14. Stripping knife
15. Tape dispenser
16. Triangles
17. T-square

_____ a. A single-edged, pointed razor blade, affixed to a handle; used to cut masking sheets and windows

_____ b. A fine-pointed artist tool used to apply opaquing solution to a negative

_____ c. Instrument, usually stainless steel or plastic, used to square work on a light table

_____ d. Instrument, usually stainless steel or plastic, used to measure, rule, and cut along an edge

_____ e. Holds rolls of tape and contains attached cutting edge

_____ f. Metal or plastic 45-45-90 or 30-60-90 degree triangles used to rule and cut along specific lines

_____ g. A shaped, sometimes looped point with handle for scratching lines on negatives

_____ h. A table with a frosted glass top and a light underneath to view flats and negatives

_____ i. Magnifying glass mounted on a small frame; used to detect negative flaws

_____ j. Used to secure flats and plates for close registration

_____ k. Cutting instrument used in trimming

_____ l. Light table with built-in vertical and horizontal straight edges, calibrated for accuracy

_____ m. Used to prevent light from reaching the plate

_____ n. Used to tape masking sheets to the light table

_____ o. Used to fasten negatives to the masking sheet and cover large pinholes

_____ p. Used to cover pinholes and scratches

_____ q. Peelable film used for stripping multi-color work

**Objective 3**

Identify the parts on a layout of a typical flat illustrated below. Write your answers in the blanks provided.

a. ______________________

b. ______________________

c. ______________________

d. ______________________

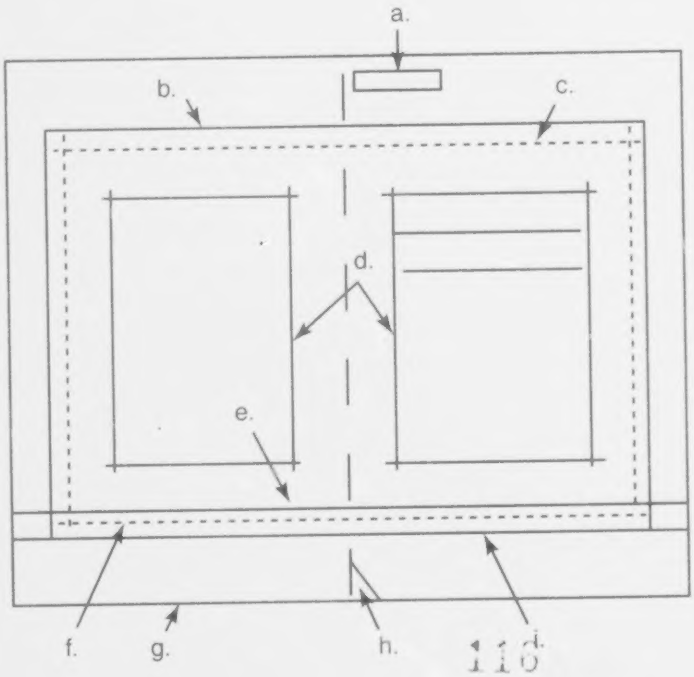
e. ______________________

f. ______________________

g. ______________________

h. ______________________

i. ______________________



## Written Test

**Objective 4**

Select true statements concerning the emulsion side and the base side of a negative by placing an "X" in the appropriate blanks.

_____ a. The emulsion side of the negative can be scratched to allow light to pass through.

_____ b. The base side of the negative carries the image.

_____ c. The base side of the negative is right-reading.

_____ d. The emulsion side of the negative is backward or wrong-reading.

_____ e. The emulsion side of the negative is coated with a non-reflective dye.

_____ f. The emulsion side of the negative is made of polyester or acetate base.

**Objective 5**

Select true statements concerning the methods of combining line and halftone work by placing an "X" in the appropriate blanks.

_____ a. To strip a halftone negative into the window of a line negative, the window must be clear.

_____ b. Halftone windows are cut from any color material for paste-up.

_____ c. When line and halftone negatives are stripped separately to the same flat, windows must be cut in the flat.

_____ d. When line and halftone negatives are stripped separately to the same flat, both negatives must be trimmed.

_____ e. Stripping and exposing negatives on separate flats requires only a single plate burn.

_____ f. Stripping and exposing negatives on separate flats requires careful positioning of negatives on flats.

**Objective 6**

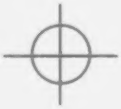
Name two types of combination printing.

a. ______________________________________________

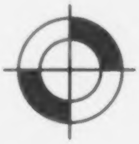
b. ______________________________________________

**Objective 7**

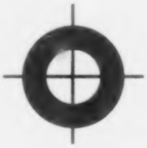
Identify the following stripping register marks and pins. Write your answers in the blanks provided.



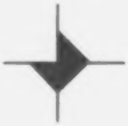
a. ______________



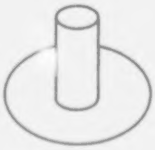
b. ______________



c. ______________



d. ______________



e. ______________

***Permission to duplicate this test is granted.**

## Answers to Written Test

**Objective 1**

a. 19
b. 5
c. 10
d. 20
e. 6
f. 11
g. 4
h. 12
i. 8
j. 16
k. 18
l. 14
m. 15
n. 9
o. 2
p. 1
q. 17
r. 7
s. 13
t. 3

**Objective 2**

a. 14
b. 7
c. 17
d. 13
e. 15
f. 16
g. 12
h. 2
i. 5
j. 9
k. 11
l. 3
m. 1
n. 6
o. 4
p. 8
q. 10

**Objective 3**

a. Position of cut-out for gray scale
b. Size of press sheet
c. Final trim size
d. Image positions laid out
e. Image limit
f. Sheet gripper margin
g. Leading edge of plate
h. Wedge cut out to indicate leading edge of plate
i. Leading edge of press sheet

**Objective 4**

a, c, d

**Objective 5**

a, c, d, f

**Objective 6**

a. Positive lettering printed on top of halftones
b. Reversed lettering printed on top of halftones

**Objective 7**

a. Alignment or single run
b. Second run
c. Fourth run
d. Third run
e. Round register pin

## Unit 6

# Stripping Procedures

**Prerequisites:**
**None**

## Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 and 2.

☐ 4. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 5. **Do** Job Sheet 1, "Establish True Edge and Vertical Alignment on a Stripping Table (Square Up)."

☐ 6. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 7. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 4 and 5.

☐ 7. **Study** Information Sheet, Objectives 3 and 4.

☐ 8. **Observe** Demonstration of procedures to be used in completing Job Sheets 2 and 3.

☐ 9. **Do** Job Sheet 2, "Strip a Ruled Flat (Right-Reading)" and Job Sheet 3, "Lay Out and Strip an Unruled Flat (Wrong-Reading)."

☐ 10. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 2 and 3, continue to step 11.

☐ 11. **Study** Information Sheet, Objective 5.

## Learning Activities Sheet

☐ 12. **Observe** Demonstration of procedures to be used in completing Job Sheet 4.

☐ 13. **Do** Job Sheet 4, "Strip a Flat for Single Color Envelopes."

☐ 14. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 15. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 4 and repeat steps 12 and 13.

☐ 15. **Study** Information Sheet, Objectives 6 and 7.

☐ 16. **Observe** Demonstration of procedures to be used in completing Job Sheets 5 and 6.

☐ 17. **Do** Job Sheet 5, "Strip a Flat for Single Color Work and Turn Imposition" and Job Sheet 6, "Strip a Flat for Single Color Work and Tumble Imposition."

☐ 18. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 5 and 6, continue to step 19.

☐ 19. **Observe** Demonstration of procedures to be used in completing Job Sheet 7.

☐ 20. **Do** Job Sheet 7, "Strip for Step-and-Repeat."

☐ 21. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 22. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 7 and repeat steps 19 and 20.

☐ 22. **Observe** Demonstration of procedures to be used in completing Job Sheets 8 and 9.

☐ 23. **Do** Job Sheet 8, "Strip a Single Color Flat for a 4-Page Signature" and Job Sheet 9, "Lay Out Signature Flats and Strip a Single Color Flat for an 8-Page Signature."

☐ 24. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 8 and 9, continue to step 25.

☐ 25. **Observe** Demonstration of procedures to be used in completing Job Sheet 10.

☐ 26. **Do** Job Sheet 10, "Strip a Single Color Step-and-Repeat Using Pin Register."

☐ 27. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 28. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 10 and repeat steps 25 and 26.

☐ 28. **Observe** Demonstration of procedures to be used in completing Job Sheet 11 through 13.

☐ 29. **Do** Job Sheet 11, "Combine Line and Halftone Work;" Job Sheet 12, "Strip for Combination Print (Double Burn With Screen Tint);" and Job Sheet 13, "Strip Complementary Flats for Multi-Color Printing."

☐ 30. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 11 through 13, continue to step 31.

☐ 31. **Observe** Demonstration of procedures to be used in completing Job Sheet 14.

☐ 32. **Do** Job Sheet 14, "Lay Out Signature Flats for a 16-Page Signature."

☐ 33. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 34. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 14 and repeat steps 31 and 32.

# Learning Activities Sheet

☐ 34. **Observe** Demonstration of procedures to be used in completing Job Sheet 15.

☐ 35. **Do** Job Sheet 15, "Strip a Two-Color Job Using Pin Register and Masking Film."

☐ 36. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 37. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 15 and repeat steps 34 and 35.

☐ 37. **Observe** Demonstration of procedures to be used in completing Job Sheets 16 and 17.

☐ 38. **Do** Job Sheet 16, "Determine Daylight Copy Proofing Exposure Using a Step-Off Test" and Job Sheet 17, "Expose a Blueline or Daylight Copy Proof."

☐ 39. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 16 and 17, continue to step 40.

☐ 40. **Check** With instructor for any additional assignments to be completed.

☐ 41. **Do** Additional assignments listed below.

☐ 42. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

***Permission to duplicate this form is granted.**

# Unit 7

# Platemaking Procedures

## Unit Contents

**Teacher Components**

**Teacher Page**

Suggested Activities . . . . . . . . . . 7–3
Written Test . . . . . . . . . . 7–7
Answers to Written Test . . . . . . . . . . 7–11
Learning Activities Sheet . . . . . . . . . . 7–13

**Student Components**

**Student Page**

Objective Sheet . . . . . . . . . . 7–3
Information Sheet . . . . . . . . . . 7–5

Job Sheets

1—Expose and Develop a Subtractive Plate . . . . . . . . . . 7–11
2—Determine Plate Exposure Using a Step-Off Test . . . . . . . . . . 7–13
3—Expose a Step-and-Repeat Plate . . . . . . . . . . 7–17
4—Make a Step-and-Repeat Plate Using Pin Register System . . . 7–19
5—Expose a Plate When Using a Screen Tint . . . . . . . . . . 7–21
6—Make Plates for a Two-Color Job . . . . . . . . . . 7–23
7—Expose a Photodirect Plate . . . . . . . . . . 7–25

## Suggested Activities

**Instructional Plan**

### Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resource" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.

### Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

## Suggested Activities

Teaching Suggestions

- Help students develop an understanding of different types of printing plates and exposure systems by planning a field trip to a nearby printing company. Watching a skilled technician strip-up a four-color process job with related areas of flat color would be extremely informative for students.

- Supplement instruction provided in this unit with related audiovisual materials or guest speakers. An area technical representative from a plate manufacturing company would be a good resource person to speak to the class. Emphasize changing technology.

- Job Sheet 7 deals with a photodirect platemaking procedure. Many school shops do not have this type of equipment although it is an important part of platemaking technology. Once again a field trip to a quick-print shop or other printing establishment that might have this type of equipment would be helpful to supplement student learning. Perhaps the instructor could obtain an exposed and processed photodirect plate to use on a press in the school shop to give students the opportunity to work with this type of imaging technology.

### Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.

- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.

- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

## Suggested Activities

Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

**Sample A**

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

**Sample B**

**Yes**—Can perform job with no additional training.
**No**—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

## Resources Used in Developing This Unit

### Print Media

- Dennis, Ervin A., and John D. Jenkins. *Comprehensive Graphic Arts*. 3rd ed. New York: Glencoe/McGraw-Hill, 1991.
- Destree, Thomas M. *The Lithographers Manual*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.
- Peck, Harold L. *Stripping: The Assembly of Film Images*. 2nd ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1988.
- 3M Imaging Systems Group. *Press Operator's Guide*. St. Paul, MN: 3M Printing and Publishing Systems, 1989.

  Note: This publication contains platemaking information formerly found in the *3M Platemaker's Guide* which is no longer in print.

## Suggested Supplemental Resource

### Print Media

- Cogoli, John E. *Photo-Offset Fundamentals*. Old Tappan, NJ: Macmillan Publishing Company, 1986.

## Written Test

Name ______________________________

Date ______________________ Score __________

**Objective 1**

Match the terms with their definitions. Definitions continue on the next page.

1. AGE
2. Blind
3. Broken image
4. Deep-etch plate
5. Deletion fluid
6. Dot
7. Dot loss
8. Dot spread
9. Grained plate
10. Gray scale
11. Gum arabic
12. Halo
13. Hone
14. Image-add pen
15. Ink-receptive
16. Ink-repellent
17. Lacquer
18. Light-sensitive coating
19. Process gum/desensitizer
20. Smooth plate
21. Squeegee
22. Surface plate

_____ a. A plate where tiny pits or indentations in the surface of the plate allow it to carry water

_____ b. A solution used to desensitize an additive plate

_____ c. Diazo compound or photopolymer which, after exposing and processing, creates image area on plate

_____ d. Solution used to preserve plate and protect surface from oxidation

_____ e. A plate in which the image and nonimage areas are level; may be exposed from either a negative or positive film flat depending on plate coating

_____ f. A plate in which the image is etched slightly below the surface; exposed from a flat composed of film positives

_____ g. A smooth rubber blade used to wipe moisture from plate surface

_____ h. Areas on plate which accept and hold ink and reject water

_____ i. Areas on plate which accept and hold water and reject ink

_____ j. A commercially-produced sensitivity guide with a 12-step negative representing the various tones from white to black; used by platemakers to determine plate exposure

_____ k. A plate whose surface is grainless

_____ l. A shadow around the edge of a halftone created by improper stripping or platemaking procedures

## Written Test

_____ m. The individual element of a halftone

_____ n. Disappearance of a dot from the plate

_____ o. Dot enlargement on the plate

_____ p. An incomplete image on the plate

_____ q. An imaged plate surface that will not accept ink

_____ r. An abrasive stone used to remove unwanted marks on the plate surface

_____ s. Solution used for hardening the image area of an additive plate

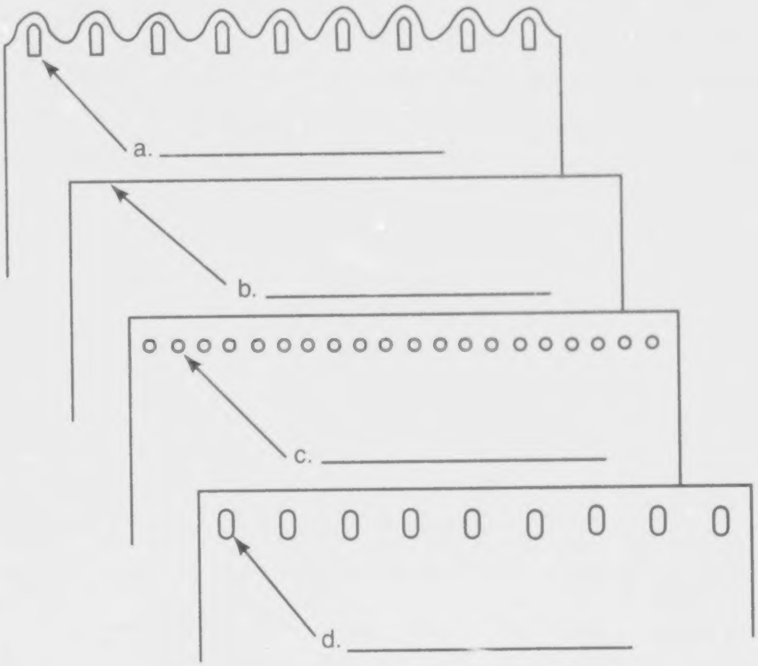
_____ t. Solution used to eliminate plate flaws or unwanted image areas

_____ u. Protective gum storage chemical typically used on plates that need to be stored for a long period of time

_____ v. A fiber-tip pen used to repair broken images on the plate surface

**Objective 2**

Identify the types of plate ends below.



**Objective 3**

Match the types of offset plates with their characteristics.

1. Deep-etch
2. Direct-image
3. Electrostatic
4. Photodirect
5. Presensitized
6. Wipe-on

_____ a. Has no sensitized coating; image accomplished by typing or hand lettering.

_____ b. Made directly in automatic platemakers making intermediate step unnecessary.

_____ c. Light-sensitive coating is applied in shop immediately before exposure.

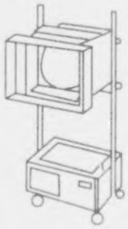
_____ d. Light-sensitive coating is applied during plate manufacturing.

_____ e. Image is produced on plate surface by an electrostatic charge.

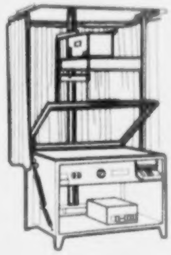
_____ f. Image area is chemically etched to a depth slightly below nonprinting area; common types are single metal and multimetal.

**Objective 4**

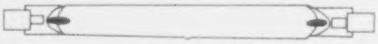
Identify the following plate exposing devices.



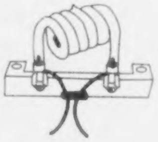
a. _____________________



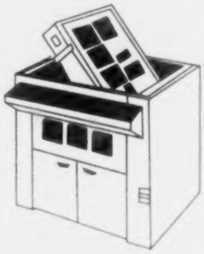
b. _____________________



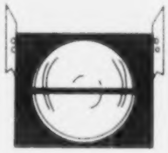
c. _____________________



d. _____________________



e. _____________________



f. _____________________

## Written Test

**Objective 5**

Match the types of presensitized plates with their characteristics.

1. Additive-working
2. Negative-working
3. Positive-working
4. Subtractive-working

_____ a. A special ink-holding coating is added during developing process

_____ b. Have a factory applied synthetic lacquer coating which is removed during development

_____ c. Produce an image area in all places on the plate that are struck by light during exposure

_____ d. Produce an image area in all places on the plate not struck by light during exposure

**Objective 6**

Select true statements concerning the gumming of plates by placing an "X" in the appropriate blanks.

_____ a. After applying gum arabic or finisher to plate, the plate should be immediately hung up to dry.

_____ b. If plate has been run, clean both sides before gumming.

_____ c. Hang up plates in such a way so that plates lie against each other.

_____ d. Gum arabic is used for long term plate storage.

**Objective 7**

Select true statements concerning handling and storing plates by placing an "X" in the appropriate blanks.

_____ a. Lift plates by opposite corners to avoid crimping or scratching.

_____ b. Avoid touching plate surfaces with fingers before and after processing.

_____ c. Pick up plates at center using only thumb and index finger.

_____ d. Plates should be stored in vertical hanging envelopes.

**Objective 8**

Select true statements related to the do's and don'ts for properly handling plates and chemicals by placing an "X" in the appropriate blanks.

_____ a. **Do** shake chemical well before using.

_____ b. **Do** look directly at light sources.

_____ c. **Do not** lean on glass-topped vacuum frame.

_____ d. **Do not** breathe chemical fumes.

_____ e. **Do** adhere to HMIS chemical handling procedures.

***Permission to duplicate this test is granted.**

## Answers to Written Test

**Objective 1**

a. 9
b. 19
c. 18
d. 11
e. 22
f. 4
g. 21
h. 15
i. 16
j. 10
k. 20
l. 12
m. 6
n. 7
o. 8
p. 3
q. 2
r. 13
s. 17
t. 5
u. 1
v. 14

**Objective 2**

a. Serrated/loop
b. Straight cut
c. Pinbar
d. Slotted/oval

**Objective 3**

a. 2
b. 4
c. 6
d. 5
e. 3
f. 1

**Objective 4**

a. Stand-alone exposing unit
b. Overhead exposing unit
c. Mercury vapor/metal halide lamp
d. Pulsed-xenon light
e. Flip-top exposing unit
f. Carbon-arc light

**Objective 5**

a. 1
b. 4
c. 2
d. 3

**Objective 6**

b

**Objective 7**

a, b, d

**Objective 8**

a, c, d, e

# Unit 7 Platemaking Procedures

**Prerequisites:**
**None**

## Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 8.

**Optional**

☐ 4. **Interview** Three employees in the platemaking department of a print shop to learn about possible career opportunities.

☐ 5. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 6. **Do** Job Sheet 1, "Expose and Develop a Subtractive Plate."

☐ 7. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 8. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 5 and 6.

☐ 8. **Observe** Demonstration of procedures to be used in completing Job Sheets 2 and 3.

☐ 9. **Do** Job Sheet 2, "Determine Plate Exposure Using a Step-Off Test" and Job Sheet 3, "Expose a Step-and-Repeat Plate."

☐ 10. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 2 and 3, continue to step 11.

☐ 11. **Observe** Demonstration of procedures to be used in completing Job Sheet 4.

☐ 12. **Do** Job Sheet 4, "Make a Step-and-Repeat Plate Using Pin Register System."

☐ 13. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 14. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 4 and repeat steps 11 and 12.

☐ 14. **Observe** Demonstration of procedures to be used in completing Job Sheet 5.

☐ 15. **Do** Job Sheet 5, "Expose a Plate When Using a Screen Tint."

☐ 16. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 17. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 5 and repeat steps 14 and 15.

☐ 17. **Observe** Demonstration of procedures to be used in completing Job Sheet 6.

☐ 18. **Do** Job Sheet 6, "Make Plates for a Two-Color Job."

☐ 19. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 20. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 6 and repeat steps 17 and 18.

☐ 20. **Observe** Demonstration of procedures to be used in completing Job Sheet 7.

☐ 21. **Do** Job Sheet 7, "Expose a Photodirect Plate."

☐ 22. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 23. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 7 and repeat steps 20 and 21.

☐ 23. **Check** With instructor for any additional assignments to be completed.

☐ 24. **Do** Additional assignments listed below.

________________________________

________________________________

________________________________

☐ 25. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 26. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

***Permission to duplicate this form is granted.**

# Unit 8 Digital Impact on Prepress Activities

## Unit Contents

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**Teacher Page**

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2—Compare and Contrast the Changes in Staffing and Training Needs in a Shop Adopting CTP Technology . . . . . 8–19
3—Analyze Effects of Digital Printing on the Printer's and Customer's View of Cost, Service, and Competitiveness . . . . . 8–21

Job Sheet

1—Create a Camera-Ready Laser Copy of a Page Containing Text and Graphics . . . . . . . . . . 8–23

## Suggested Activities

**Instructional Plan**

### Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resources" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make transparencies from the transparency masters included in this unit. These appear in the teacher edition only.

### Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss the assignment sheets. Review with students the criteria for evaluation of these activities.

## Suggested Activities

- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

Teaching Suggestions

- Discuss with students the dramatic changes digital technology is having on the printing industry and careers of those involved.

- If possible, plan a field trip to a printing operation undergoing the transition to digital prepress activities. Students should have the opportunity to ask questions of the employees and management personnel concerning the transition and where they will fit in the industry as future employees.

- Demonstrate to students how to use a digital camera and explain the benefits of digital photography.

- Discuss Student Supplements 1 through 3 and how they relate to the assignment sheets. Assign the prescribed research and assign reports based on the assignment sheets.

- Provide students with access to personal computers and page-layout software, along with a laser printer. Explain this equipment's use, and familiarize students with basic controls and commands. Save a text file and a graphics file for use in Job Sheet 1 as students use the equipment to output a camera-ready laser copy.

### Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.

- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.

- Evaluate the assignment sheets. Rate the student using the criteria listed on each assignment sheet. See Answers to Assignment Sheets for correct answers where applicable. If the student's performance is unacceptable, have the student review the appropriate materials and complete the assignment again.

- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

**Sample A**

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

**Sample B**

**Yes**—Can perform job with no additional training.
**No**—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

## Resources Used in Developing This Unit

### Print Media

- Bruno, Michael H. *Printing in a Digital World.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1995.
- *PageMaker 5.0 Introduction, Student Manual.* Rochester, NY: Logical Operations, 1993.
- *Pocket Pal, A Graphic Arts Production Handbook.* Memphis, TN: International Paper Co., 1997.

## Suggested Activities

**Suggested Supplemental Resources**

### Electronic Media

- Graphic COMM Central—http://teched.vt.edu/gcc/
  This site contains a wide range of educational information about graphic arts.

- PrePRESS Main Street—http://www.prepress.pps.com/
  This site provides a wealth of information about electronic prepress and CTP technology.

- Digital Photography Center—http://209.133.8.24/site_index.htm
  This site contains short courses in digital photography as well as teacher resources.

## Answers to Assignment Sheets

**Assignment Sheet 1**

### Collect Current Event Material Relating to Digital Printing

Student should provide instructor with at least 12 current articles from printing industry periodicals concerning staffing, training, and changing roles of printers and their customers in the digital printing age.

**Assignment Sheet 2**

### Compare and Contrast the Changes in Staffing and Training Needs in a Shop Adopting CTP Technology

Report should contain a discussion concerning CTP technology's effects on staffing and training needs of the printing industry, along with discussion of personnel and workflow problems one might encounter in a shop adopting CTP technology. Evaluated to the satisfaction of the instructor.

**Assignment Sheet 3**

### Analyze Effects of Digital Printing on the Printer's and Customer's View of Cost, Service, and Competitiveness

Report should discuss changing viewpoints of printers and their customers concerning cost, service, and competitiveness in the face of the growing influence of digital printing technology. Evaluated to the satisfaction of the instructor.

## Written Test

Name ______________________________

Date ______________________ Score __________

**Objective 1**

Match the terms with their definitions.

1. Computer-to-metal-plate
2. CTP
3. Desktop publishing
4. Digital camera
5. Digital imaging
6. Digital printing
7. Direct imaging
8. Imagesetter
9. RIP
10. Trapping

_____ a. The product of imagesetting equipment in fully composed pages

_____ b. The degree to which overprinting colors overlap to eliminate white lines between colors in printing

_____ c. Technology which allows the operator of a desktop publishing terminal to output a digitized document directly to a platemaker, press, or other printing device

_____ d. A device which encodes a computer's page description language into bitmaps (or graphics cues) used by an imagesetting machine

_____ e. Using a personal computer, appropriate software, and an output device to combine text and graphics to produce a document

_____ f. A machine combining the functions of a printer, recorder, and RIP which is capable of outputting a fully composed page to a platemaker, press, or other printing device

_____ g. A system using a number of computer and electronic technologies to integrate color separation, correction, retouching, page makeup, text editing, and imposition—without the use of intermediate film steps

_____ h. High-end systems which use digital information to create a metal plate directly, without the use of intermediate films; produces high quality output; generally only used in large printing facilities

_____ i. The use of digitized files to drive equipment which produces reproductions directly on the substrate without the need for intermediate films or plates

_____ j. A filmless photographic device that is used to capture an image on electronic media that can be downloaded to a computer for manipulation and storage

## Written Test

**Objective 2**

Select types of digital printing systems by placing an "X" in the appropriate blanks.

_____ a. Computer-to-plate—Systems which use digital information to create a printing plate directly, without the use of intermediate films

_____ b. Digital pulse engraving—Systems which use digital information to control a Telsa coil and pulsed-arc to engrave gravure and flexography plates without intermediate films

_____ c. Computer-to-print—Systems which use digital information to control electro-photographic, ionographic, magnetographic, ink-jet, or thermal transfer imaging to produce reproductions directly, without the use of intermediate films or plates

_____ d. CompuGraphic X1000 & X4400—Systems using digital engineering so advanced it is still classified and not yet commercially available

**Objective 3**

Complete statements concerning the types of computer-to-plate printing systems by circling the correct words.

a. Plates or image carriers for gravure and flexography on which images can be produced by etching the surface with **(an acidic fountain solution, lasers or electromechanical engravers)**

b. High-speed light-sensitive plates for lithography coated with emulsion to be exposed by low-power **(visible, infrared)** lasers

c. Non-light-sensitive plates for lithography coated with emulsion on which images can be exposed by **(a controlled radiation burst, heat)** rather than light

**Objective 4**

Explain the unique capability of computer-to-print systems.

______________________________________________

______________________________________________

______________________________________________

______________________________________________

**Objective 5**

List three technologies using computer-to-print engineering.

a. ______________________________________________

b. ______________________________________________

c. ______________________________________________

## Written Test

**Objective 6**

Compare and contrast a traditional printing operation to a digital printing operation.

*Permission to duplicate this test is granted.

## Answers to Written Test

**Objective 1**

a. 5
b. 10
c. 2
d. 9
e. 3
f. 8
g. 6
h. 1
i. 7
j. 4

**Objective 2**

a, c

**Objective 3**

a. Lasers or electromechanical engravers
b. Visible
c. Heat

**Objective 4**

Answer should include the following in student's own words.

Computer-to-print systems are derivatives of electrostatic copying machines in which the image recorded must be repeated for each impression. Because of this, these systems are capable of printing variable information from impression to impression—depending upon digital information stored in the driving computer. All go directly from an imagesetter to a press-like device without intermediate films or plates.

**Objective 5**

Answers may be in any order.

a. Electronic printers
b. Color copiers
c. Electronic printing systems

**Objective 6**

Evaluated to the satisfaction of the instructor. Answers should contain references to the lack of paste-up, computerized creation of text and graphics, etc.

# Unit 8 Digital Impact on Prepress Activities

**Prerequisites:**
**None**

## Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 and 2 and Student Supplement 3.

☐ 4. **Do** Assignment Sheet 1, "Collect Current Event Material Relating to Digital Printing."

☐ 5. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 6. If the evaluation is not satisfactory, repeat steps 3 and 4.

☐ 6. **Study** Information Sheet, Objectives 3 through 6 and Student Supplements 1 and 2.

☐ 7. **Do** Assignment Sheet 2, "Compare and Contrast the Changes in Staffing and Training Needs in a Shop Adopting CTP Technology."

☐ 8. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 9. If the evaluation is not satisfactory, repeat steps 6 and 7.

☐ 9. **Research** Online resources regarding CTP technology and electronic prepress activities. Visit www.prepress.pps.com as one of your sources.

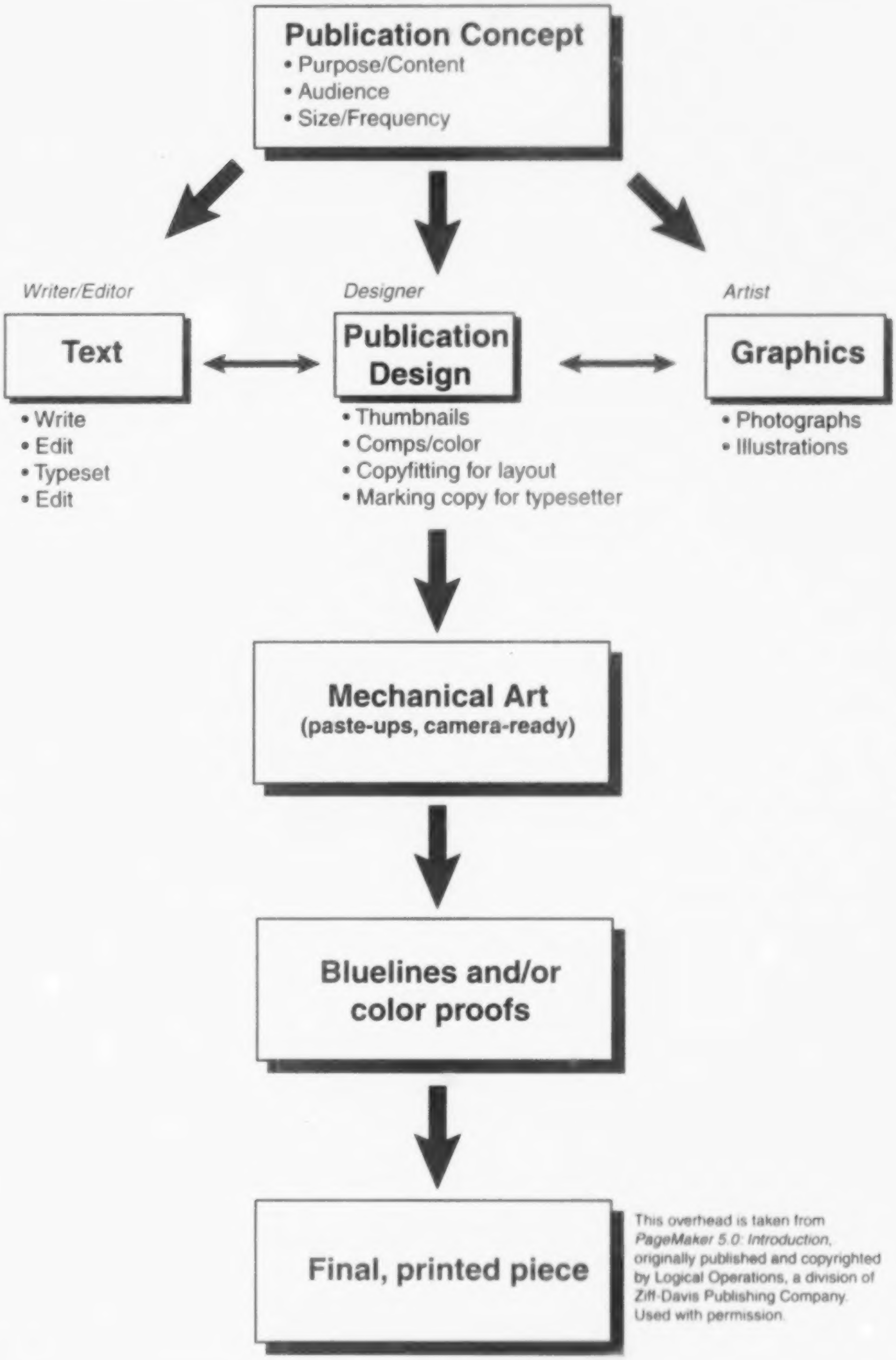
☐ 10. **Do** Assignment Sheet 3, "Analyze Effects of Digital Printing on the Printer's and Customer's View of Cost, Service, and Competitiveness."

## Learning Activities Sheet

| | | |
|---|---|---|
| ☐ 11. | **Stop** | Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 12. If the evaluation is not satisfactory, repeat step 10. |
| ☐ 12. | **Do** | Job Sheet 1, "Create a Camera-Ready Laser Copy of a Page Containing Text and Graphics." |
| ☐ 13. | **Stop** | Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 14. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat step 12. |
| ☐ 14. | **Check** | With instructor for any additional assignments to be completed. |
| ☐ 15. | **Do** | Additional assignments listed below.<br>____________________<br>____________________<br>____________________ |
| ☐ 16. | **Take** | Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations. |
| ☐ 17. | **Stop** | Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions. |

***Permission to duplicate this form is granted.**

# Overview of Traditional Printing



**Publication Concept**
- Purpose/Content
- Audience
- Size/Frequency

*Writer/Editor*

**Text**
- Write
- Edit
- Typeset
- Edit

*Designer*

**Publication Design**
- Thumbnails
- Comps/color
- Copyfitting for layout
- Marking copy for typesetter

*Artist*

**Graphics**
- Photographs
- Illustrations

**Mechanical Art**
**(paste-ups, camera-ready)**

**Bluelines and/or color proofs**

**Final, printed piece**

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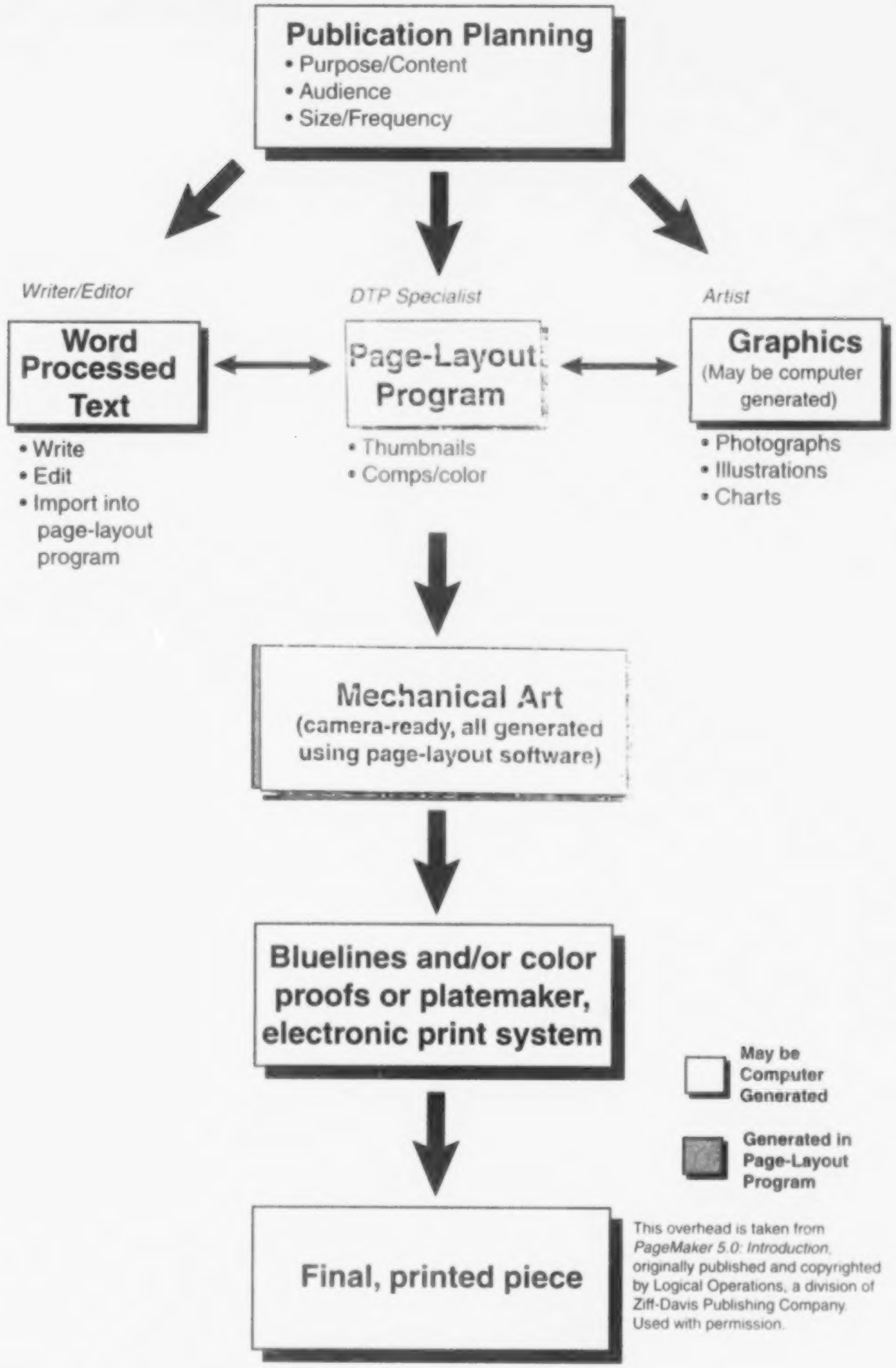
# Overview of Digital Printing



**Publication Planning**
- Purpose/Content
- Audience
- Size/Frequency

*Writer/Editor*

**Word Processed Text**
- Write
- Edit
- Import into page-layout program

*DTP Specialist*

**Page-Layout Program**
- Thumbnails
- Comps/color

*Artist*

**Graphics**
(May be computer generated)
- Photographs
- Illustrations
- Charts

**Mechanical Art**
(camera-ready, all generated using page-layout software)

**Bluelines and/or color proofs or platemaker, electronic print system**

**Final, printed piece**

☐ **May be Computer Generated**

▨ **Generated in Page-Layout Program**

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# Graphic Arts

# Process Camera, Stripping, and Platemaking

## Fourth Edition

## Student Edition

Project coordinated by

Cheryl Barr

Developed by

Multistate Academic and Vocational Curriculum Consortium, Inc.
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Unit 6: Stripping Procedures

Unit 7: Platemaking Procedures

Unit 8: Digital Impact on Prepress Activities

# Unit 1

# The Process Camera and Darkroom Equipment

## Unit Contents

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  1—Prepare a Darkroom for Tray Processing, and Expose and Develop a Line Negative . . . . . . . . . . . . . . . . . 1–19

# Unit 1

# The Process Camera and Darkroom Equipment

## Objective Sheet

**Unit Objective**

After completing this unit, the student should be able to set up a graphic arts darkroom, use a process camera to expose graphic arts film, and process a line negative. The student should demonstrate these competencies by completing the assignment sheets and job sheet and by scoring a minimum of 85 percent on the written test.

**Specific Objectives**

After completing this unit, the student should be able to:

1. Define process camera.
2. Identify the parts of process cameras.
3. Match the parts of a process camera with their functions.
4. Match types of camera copy with their descriptions.
5. Match darkroom equipment/supplies with their uses.
6. Match types of camera film with their physical characteristics.
7. Select true statements concerning darkroom cleanliness.
8. Select true statements concerning darkroom safety.
9. Interpret Hazardous Materials Identification System (HMIS) labels.
10. Collect types of copy. (Assignment Sheet 1)
11. Complete a darkroom safety worksheet. (Assignment Sheet 2)
12. Compile data on chemical hazards in the darkroom. (Assignment Sheet 3)
13. Prepare a darkroom for tray processing, and expose and develop a line negative. (Job Sheet 1)

## Information Sheet

Objective 1

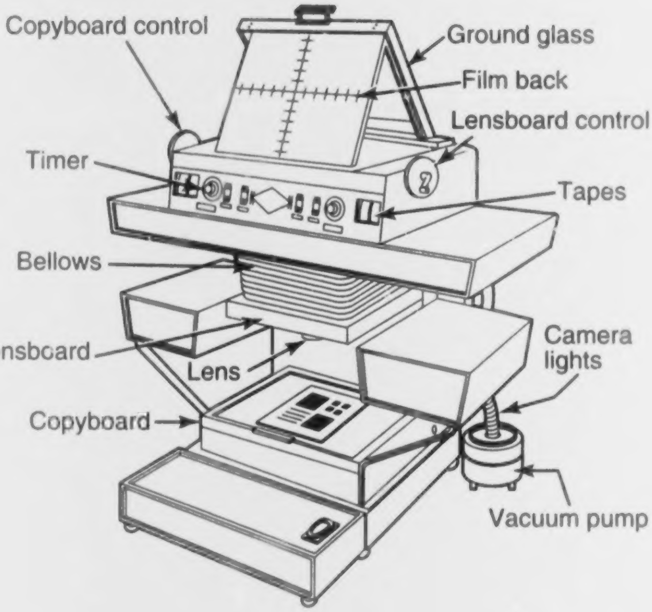
**Definition of a process camera**—A large, sturdy camera used for photographing flat surfaces

Objective 2

**Parts of process cameras**

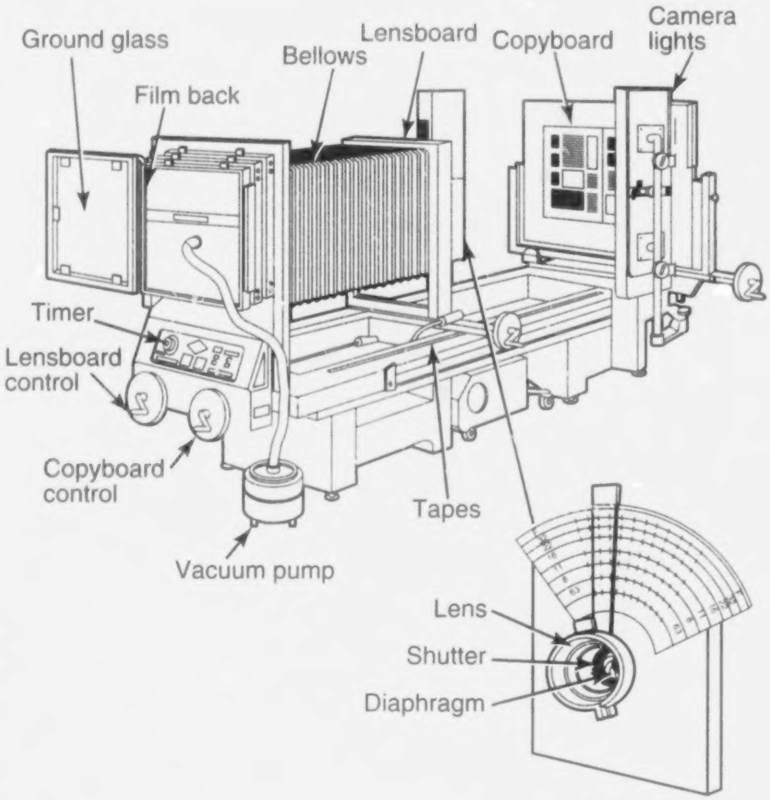
a. **Vertical camera**

Figure 1


Copyboard control
Ground glass
Film back
Lensboard control
Timer
Tapes
Bellows
Camera lights
Lensboard
Lens
Copyboard
Vacuum pump

b. **Horizontal camera**

Figure 2


Ground glass
Bellows
Lensboard
Copyboard
Camera lights
Film back
Timer
Lensboard control
Copyboard control
Vacuum pump
Tapes
Lens
Shutter
Diaphragm

**Objective 3** **Parts of a process camera and their functions**

a. Copyboard—A flat surface used to hold copy, equipped with a hinged glass cover to hold copy in place

b. Camera lights—Attached to the copyboard and used to illuminate copy

c. Lensboard—Holds the lens, diaphragm, and shutter

d. Bellows—A light-tight, accordion-like chamber between the front case and camera back

e. Ground glass—A piece of ground or frosted glass that is positioned on the back of the camera to aid in focusing

f. Film back—A hinged gate that holds the film in place, usually by means of a vacuum

g. Lensboard control—A crank which changes the position of the lensboard for a correct size and properly focused image

h. Copyboard control—A crank which changes the position of the copyboard for a correct size and properly focused image

i. Vacuum pump—A vacuum device with the hose attached to the camera back

j. Timer—A timing device that is linked to the shutter

k. Shutter—A device that controls the duration of light striking the film

l. Diaphragm—A device that controls the quantity of light striking the film

Note: A diagram is also referred to as an aperture.

m. Lens—One or more pieces of optical glass designed to collect and focus rays of light to form a sharp image on film

Note: Some cameras may have filter holders which are attached to the lens mount and hold the filter in place; others may be incorporated into the lens shade.

n. Tapes—Two narrow strips of thin, flexible steel or plastic marked off in percentage units

Note: One tape is attached to the front case and the other to the copyboard to show the exact ratio of enlargement or reduction of the copy.

**Objective 4**

**Types of camera copy and their descriptions**

a. Line—Black-and-white copy consisting of a single shade of black usually on a white background

b. Halftone—Black-and-white copy with intermediate shades of gray

Example: Black-and-white photograph

c. Full color—Illustrative material where subject matter is represented in full color (original hue)

**Objective 5**

**Darkroom equipment/supplies and their uses**

a. Darkroom timer—Used to indicate elapsed time during processing or to operate or control darkroom equipment

b. Thermometer—A device used to measure the temperature of liquids

c. Graduate—A container used for mixing and measuring chemicals

d. Safelight—An enclosed darkroom lamp fitted with a filter to screen out light rays to which film and paper are sensitive

## Information Sheet

e. Camera (graphic arts) film—A photosensitive material consisting of a light sensitive emulsion, clear base material, and an antihalation coating

Examples: Lith and rapid access

f. Paper—A sensitized material with opaque base used for reproduction processes

g. Developer—A solution used to turn the latent image into a visible image on exposed films or photographic paper

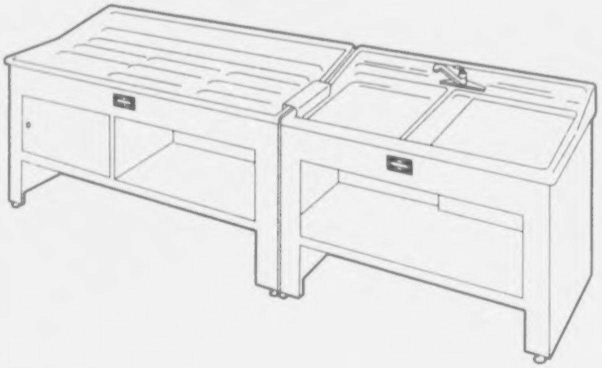
h. Stop bath—A weak solution of acetic acid, used in processing black-and-white film or paper; it stops development, prevents stains on paper, and makes the fixer last longer

i. Fixer—A solution that removes any light-sensitive material not acted upon by light or developer, leaving a black-and-white negative or print that can no longer be affected by action of light

j. Temperature control sink—A source of running water with a built-in unit that cools or heats the water to desired temperature

k. Viewing table—A water-tight light table equipped with ortho safe and white light; may be used for film inspection during processing with ortho, or after processing with white light

Figure 3



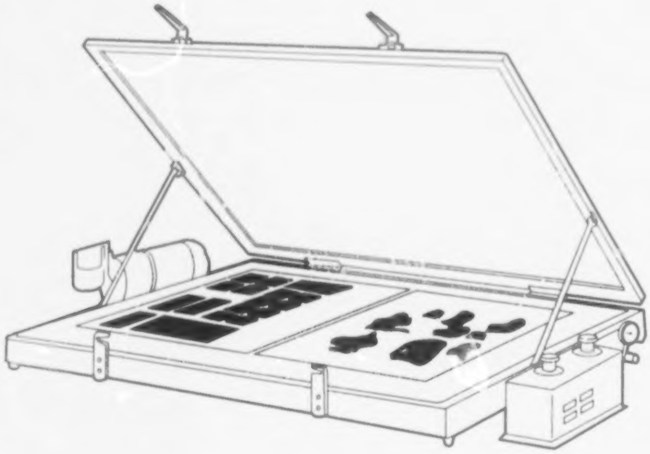
l. Film cutter—A device used to cut or trim large sheets of film or paper to desired size

**Caution:** Keep fingers away from cutting edges.

m. Contact printing frame—Used to make same size reproduction from a negative or any other transparent or translucent material

Note: Many print shops, to make efficient use of equipment investments, use the plateburner to make same size—or contact prints—instead of investing in a separate contact printing frame.

Figure 4



n. Film dryer—An instrument that supplies heat and air to speed drying time on films and papers

o. Light trap—Method of providing entrance and exit from a darkroom without allowing light to enter the darkroom; the most common type is the revolving door

p. Diffusion transfer processor—A device that contains an activator and is used primarily for processing diffusion transfer materials

q. Tray processing—Hand method of processing film using three trays and a running water bath; the trays contain developer, stop bath, and fixer

r. Automatic film processing—Mechanical device for processing film automatically using developer, fixer, wash, and dryer

Objective 6

**Types of camera (graphic arts) film and their physical characteristics**

a. Lith—Basic camera film which provides high contrast negatives; it has a very narrow exposure latitude and requires precise control in development; requires a two-part developer identified as part A and part B.

b. Rapid access—A continuous tone film used in camera work; has a high degree of latitude in processing and is the fastest system used for producing negatives; requires a one-part developer.

## Information Sheet

**Objective 7**

### Darkroom cleanliness

Note: Dirt and dust in a darkroom can lower the quality of the developing and printing work done there. It is important to keep the darkroom clean.

a. Keep as much equipment as possible off the floor where dust is likely to collect.

b. Mop the floor frequently.

c. If possible, install a ventilator with a dust filter, and replace or clean the filter often.

d. Keep all work surfaces clean.

e. Clean up spilled chemicals immediately.

   Note. Dried chemicals are a source of dust.

f. Set up and follow a regular cleanup routine.

g. No smoking.

**Objective 8**

### Darkroom safety

**Caution:** Working with chemicals and electrical equipment can be dangerous.

a. The camera should be operated or darkroom chemicals mixed only after a demonstration has been given by the instructor and the student has the permission of the instructor to complete the task.

b. Always keep supplies and equipment labeled and stored in the same location, and become familiar with each location.

c. Do not attempt to mix chemicals unless white room lights are on.

d. When mixing chemicals always pour chemical into water.

e. Wear suggested personal protective devices (apron, goggles, and rubber gloves) when mixing film processing chemicals.

f. Have an eyewash station nearby in the event a chemical gets splashed into the eye(s).

g. Wash hands after coming into contact with film processing chemicals, and identify the source of irritant and obtain treatment if skin should become irritated.

h. Allow eyes to adjust to the darkroom environment before beginning work.

i. Clean up moisture on floors and working surfaces immediately to avoid slips and falls.

j. Store darkroom chemicals in nonbreakable containers on the lowest available shelf.

k. Ground all electrical equipment.

l. Never handle electrical equipment with wet hands or when standing on a wet floor.

m. Darkroom equipment should always be turned off and unplugged before it is cleaned.

Objective 9

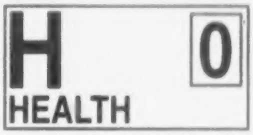
## Hazardous Materials Identification System (HMIS) labels

a. HMIS is a coding system used by the graphics industry to alert workers about potential health or physical hazards that may be created when using certain chemicals. Suggested personal protection devices are also part of the labeling system.

b. The HMIS common labeling system as used by many printing plants consists of identifying hazardous material by using numbers, colors, symbols, and/or letters. The HMIS labeling system specifically identifies four areas which include the following:

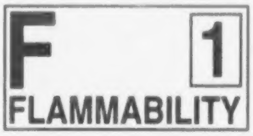
- **Health hazard**: Identified by the color **blue** and the letter **H**. The numbers 0–4 are used to indicate the severity of the health hazard as indicated below.

4H—severe hazard
3H—serious hazard
2H—moderate hazard
1H—slight hazard
0H—minimal hazard



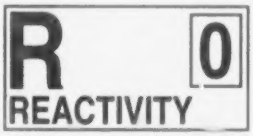
- **Flammability hazard**: Indicated by the color **red** and the letter **F**. Severity of hazard indicated below.

4F—extremely flammable
3F—flammable
2F—combustible
1F—slightly combustible
0F—will not burn



- **Reactivity hazard**: Indicated by the color **yellow** and the letter **R**. Severity of hazard indicated below.

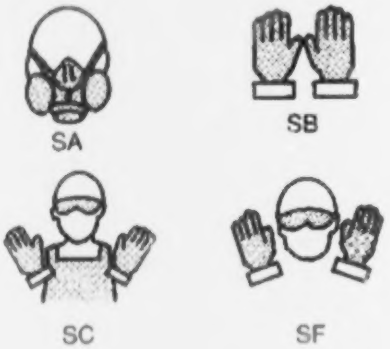
4R—may detonate or explode
3R—shock or heat may detonate
2R—violent chemical change
1R—unstable if heated
0R—stable



- The fourth section of the HMIS label consists of a combination of alphabetic characters and/or illustrations to recommend personal protection equipment as indicated below.

Figure 5

HMIS Personal Protection Symbols



**Objective 10**

## Assignment Sheet 1—Collect Types of Copy

Name ______________________ Overall Rating __________

Date ______________________

| Evaluation Criteria | Rating |
|---|---|
| • Directions were followed | ______ |
| • Correct number of unique examples of each of three types of copy found in the printing process are provided | ______ |

**Basic Skills**

Reading

Critical Thinking

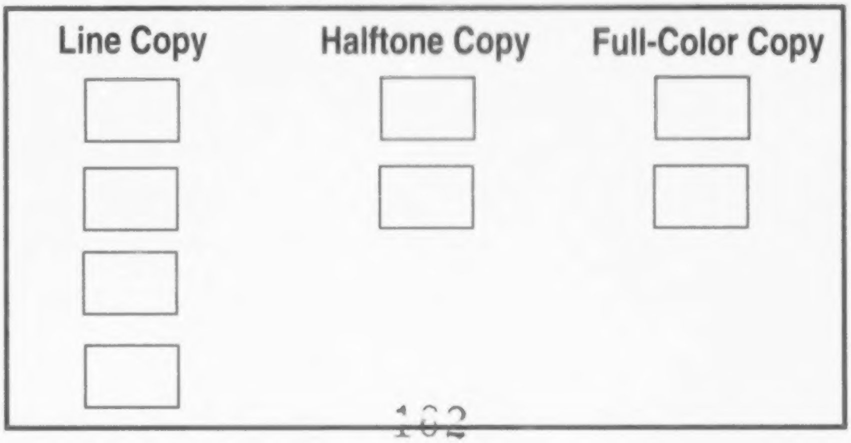
**Introduction**

In order to use the process camera according to industry standards, the student must be able to categorize the various types of copy available for reproduction.

**Directions**

In this activity, you are to collect different examples of copy and mount them on an 11 x 8 1/2 inch piece of paper in the arrangement shown below. Be sure to write the headings as indicated.

- For line copy, include an example of each of the following: typeset copy, clip art, typewritten copy, and an illustration done in a light blue pen or pencil.
- For halftone copy, include an example of each of the following: small black-and-white photograph and a piece of art using any other media that has a good representation of black-and-white tonal value.
- For full-color copy, include an example of each of the following: small color photograph and a piece of art using any other media that has a good range of color.



**Objective 11**

## Assignment Sheet 2—Complete a Darkroom Safety Worksheet

Name ______________________ Overall Rating __________

Date ______________________

| Evaluation Criterion | Rating |
|---|---|
| • Answers are correct | ______ |

**Basic Skills**

Reading Writing

**Introduction**

The use of potentially harmful chemicals, electricity and varying light conditions make darkroom work hazardous if basic safety precautions are not followed. This exercise will familiarize the student with safety procedures and precautions which will prevent serious injury and ailment.

**Directions**

Given the situations below, complete each statement by giving the necessary information.

1. The camera should be operated or darkroom chemicals mixed only after a demonstration has been given by the ______________ and the student has the permission of the ______________ to complete the task.
2. ______________________ should be worn by the student when mixing or working with chemicals used in the darkroom.
3. When storing chemicals it is desirable to ______________ ______________________________.
4. Darkroom equipment should always be ______________ before it is cleaned.
5. If a camera operator's skin should become irritated by any of the film processing chemicals, the individual should ______________ ______________________________.

## Assignment Sheet 2

6. If some film processing chemical is spilled on the floor, the camera operator should ______________________________.

7. The correct way to mix film processing chemicals with water is to

______________________________.

8. When a camera operator is ready to plug in the film dryer while holding a wet piece of film, he/she should first ______________________________

______________________________.

9. In the event that some chemical gets splashed into the eye while mixing chemicals or performing other darkroom duties, a(n) ______________________________ should be available within the darkroom.

10. Do not attempt to mix chemicals unless ______________________________

are on.

**Objective 12**

## Assignment Sheet 3—Compile Data on Chemical Hazards in the Darkroom

Name ______________________ Overall Rating ________

Date ______________________

| Evaluation Criteria | Rating |
|---|---|
| • Directions were followed | ______ |
| • Completed table correctly | ______ |
| • Presented accurate information | ______ |

**Basic Skills**

Reading Writing Critical Thinking Oral Communication

**Introduction**

It is important for you to know the potential hazards of the chemicals you use in the darkroom. You can injure yourself or physically damage equipment and materials if you mishandle, incorrectly use, or improperly store darkroom chemicals.

**Directions**

For this activity, pair up with another student. Your instructor will provide you with the material safety data sheets (MSDS) for chemicals used in your facility's darkroom. Using these MSDSs, complete the table on the next page. After you have completed this table, present a short summary of the hazards involved with each chemical to your class.

# Assignment Sheet 3

| Chemical Name | Uses | Potential Hazards | Routes of Entry Into the Body | Personal Protective Equipment Required | Storage Requirements | Disposal Requirements |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**Objective 13**

## Job Sheet 1—Prepare a Darkroom for Tray Processing, and Expose and Develop a Line Negative

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Darkroom was prepared correctly for tray processing with chemicals placed in correct order | ______ |
| • Negative was properly exposed and developed | ______ |

**Basic Skills**

Reading    Critical Thinking    Employability

**Introduction**

A somewhat standard layout is associated with darkroom tray processing, whether it be a graphic arts darkroom or a hobby or professional photographic processing lab. This exercise will familiarize you with that layout—based on the sequence of chemical use—and with procedures involved with process negative exposure and development.

**Tools, equipment, and materials**

- Trays (3)
- Graduate
- Thermometer
- Storage containers (when necessary)
- Graphic arts film
- Graphic arts developer
  Note: This may be either lith or rapid access. Ask your instructor to help you identify which type.
- Stop bath, 28% acetic acid or indicator stop bath
- Fixer solution (appropriate for type of developer used)
- Copy collection from Assignment Sheet 1

**Procedure**

Note: Since the quantity of chemical is dependent on the tray size to be used, ask your instructor how much to mix.

☐ 1. Prepare developer in first tray (Figure 1).

Note: Check manufacturer's recommendations.

☐ 2. Prepare stop bath in second tray (Figure 1).

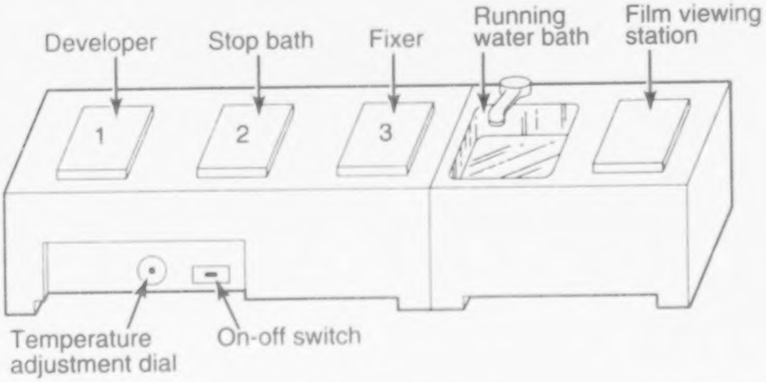
☐ 3. Prepare fixer solution in third tray (Figure 1).

☐ 4. Place thermometer in sink.

☐ 5. Fill water jacket in sink according to recommendation of instructor.

☐ 6. Set temperature control unit on sink for type of film being used—lith type 68° F, rapid access usually 75–85° F (Figure 1).

Figure 1—Temperature control sink showing sequence of chemicals and wash basin



Note: If the sink is not equipped with a temperature control unit, cold or hot water may be added to adjust water temperature in the water jacket. During the summer months, normal water temperature may not get cool enough for processing lith film. Cold water from a drinking fountain or ice may be added to the water jacket to provide necessary chemical temperature for film processing. Also, most developers can be used at temperatures other than the recommended ideal. In the case of temperatures warmer than the ideal, development times will be less than recommended, and with cooler temperatures than the ideal, development times will be longer. Consult with your instructor and/or developer labels for calculating proper development times if ideal temperature control is not possible.

☐ 7. Place a thermometer in the developer tray to assure solution is at the proper temperature before processing film.

☐ 8. Turn on safelights, and turn off white lights.

☐ 9. Locate copy you prepared for Assignment Sheet 1.

☐ 10. Mount copy in copyboard and set up camera for a 100% reproduction.

Note: Check with instructor for proper film, recommendations for exposure time, and processing time and procedure.

☐ 11. Set exposure timer.

☐ 12. Mount film on vacuum back.

☐ 13. Make exposure.

☐ 14. Process film according to recommended procedure.

☐ 15. Evaluate negative for accurate reproduction of original copy.

Note: Have the instructor help you evaluate reproduction requirements of original copy.

☐ 16. Clean work area.

Evaluator's comments: ________________________________

________________________________________________

________________________________________________

## Unit Contents

**Student Components**

Student Page

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Job Sheet

1—Set Up a Process Camera and Determine Exposures . . . . . . . . 2-15

## Objective Sheet

**Unit Objective**

After completing this unit, the student should be able to determine a basic exposure for a solid 4 on the gray scale and make necessary exposure adjustments to compensate for percentage of reproduction size and quality of copy. The student should demonstrate these competencies by completing the assignment sheet and job sheet and by scoring a minimum of 85 percent on the written test.

**Specific Objectives**

After completing this unit, the student should be able to:

1. Match terms related to line photography with their definitions.
2. Complete statements concerning principles of line photography (theory of photography).
3. Distinguish between types of film base material.
4. Match types of emulsion with their descriptions.
5. Describe degrees of density.
6. State an exposure rule for recording density steps on a gray scale.
7. Identify parts of a typical lens assembly.
8. Select true statements concerning the characteristics of an aperture.
9. Select true statements concerning the functions of filters.
10. Apply an exposure rule for different steps on the gray scale. (Assignment Sheet 1)
11. Set up a process camera and determine exposures. (Job Sheet 1)

## Information Sheet

Objective 1

### Terms and definitions

a. **Color copy**—Copy where the background and/or image is in a color other than black

b. **Densitometer**—Instrument for reading photographic densities

c. **Density**—Lightness or darkness of a particular piece of copy

Note: For graphic arts purposes, the density scale typically runs from 0 to 2.00; 0 being white and 2.00 being black.

d. **Emulsion**—Light-sensitive coating on photographic materials

e. **Filter**—Colored device made commonly of gelatin or glass; placed in front of the lens to reduce or eliminate light of certain colors and allow the light of other colors to pass through onto the film for exposure

f. **Filter factor**—A number multiplied by the normal exposure to achieve the necessary exposure increase when using a filter

g. ***F*/stop**—The diameter of the lens opening

Note: An "*F*/stop" represents a given lens opening according to its diameter in relationship to the distance from the film plane to the optical center of the lens when the lens is focused to infinity. The resulting numbers are a fraction: i.e. *f*/22 = an aperture diameter equal to $^1/_{22}$ the distance from the film plane to the optical center of the lens. Changing the *f*/stop one increment up in numerical value therefore cuts the amount of light reaching the film in half: i.e. *f*/22 to *f*/32. Decreasing the *f*/stop number by one doubles the amount of light: i.e. *f*/8 to *f*/11.

h. **Line copy**—Any image composed of solid dark areas against a white background

i. **Normal copy**—Copy with a good dense black image and a white background

Note: Normal copy is typically exposed so the negative will develop out to a solid 4 on the gray scale.

j. **Photo factor**—States that every exposure increase of .30 density requires a 2X exposure factor

k. **Reflection gray scale**—Commercially-produced strip of photographic paper stepped (usually 12) in increasing density values of .15 for each step

l. **Resolving power**—Ability of a lens or film emulsion to record fine detail

m. **Running water bath**—Removes residual effects of film processing chemicals; makes the film more permanent

n. **Unusual copy**—Copy that fits either extreme; extra heavy, light or extra light

Note: Typically these categories of copy require exposures for developing the negative to different steps on the gray scale.

o. **White light**—Electromagnetic radiation having different wave lengths that produce different colors, such as red, green and blue

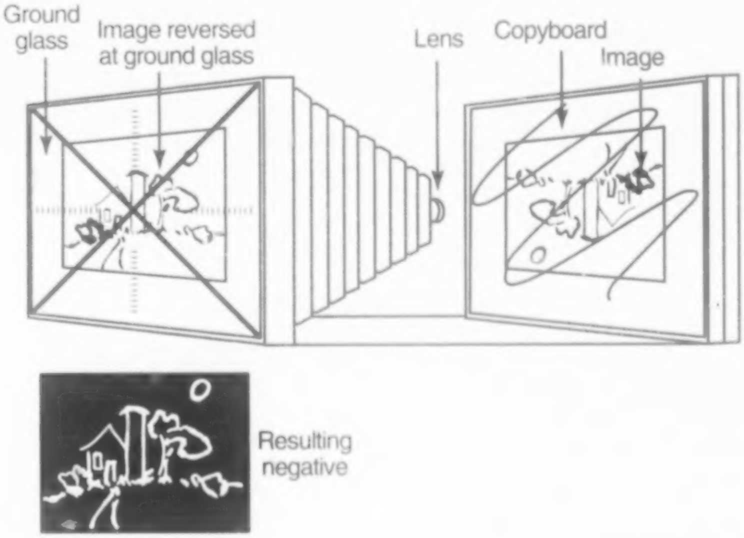
Objective 2

**Principles of line photography (theory of photography)**

a. Light rays travel in a straight line as they are projected through the lens of a camera.

b. An image must be placed in the copyboard upside down in order to be viewed right when reading from the ground glass.

Figure 1



c. When camera lights illuminate the copy in the copyboard, light copy areas reflect light and dark copy areas absorb light.

- The reflected portion of the light passes through the lens and exposes the emulsion of the film creating a latent image.
- The dark copy area does not record an exposure on the film, thus the image area shows up clear on the developed film.

**Objective 3**

### Types of film base material

Note: The film base constitutes 70–85% of the total film thickness.

a. Nonstable base—Inexpensive material such as plastic or acetate; suitable for most line work where precise image registration requirements are not necessary

b. Dimensionally stable base—Very stable base material such as polyester; used for halftones and other critical work requiring precise image stability

**Objective 4**

### Types of emulsion

a. Orthochromatic—Sensitive to colors of the visible spectrum with the exception of red

b. Panchromatic—Sensitive to all colors of light in the visible spectrum

c. Blue-sensitive—Sensitive primarily to blue portion of the spectrum

Note: This type of film is used extensively for film contacting operations as opposed to camera procedures.

**Objective 5**

### Degrees of density

a. Opaque—Blocks out all light

b. Translucent—Blocks out only a portion of the light

c. Transparent—Allows almost all light to pass through

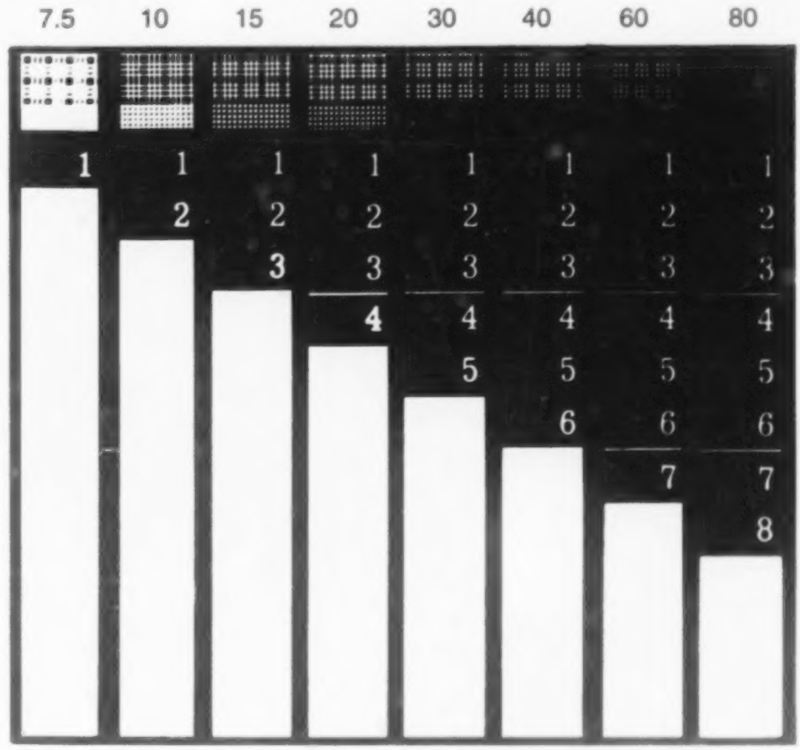
Note: A line negative should have a transparent image area and an opaque background or nonimage area.

## Information Sheet

**Objective 6**

**Exposure rule for recording density steps on a gray scale**—Every change in density of .30 (2 steps on the gray scale or 1 *f*/stop) requires either twice or half as much exposure (depending on whether one is going up or down the scale).

Figure 2



Developed Gray Scale

Courtesy Stouffer Graphic Arts Equipment Company

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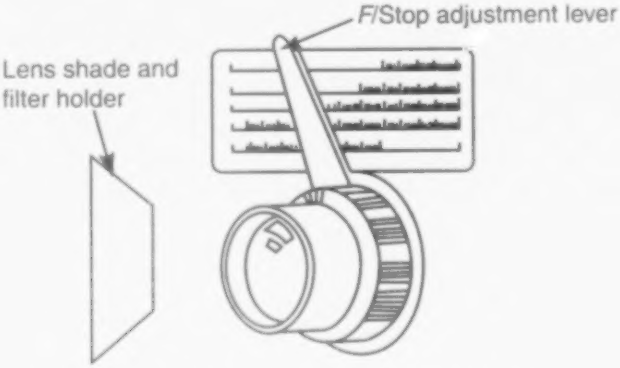
**Objective 7**

**Parts of a typical lens assembly**

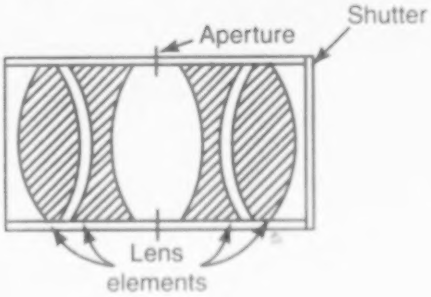
a. View from front of camera

Figure 3


F/Stop adjustment lever
Lens shade and filter holder

b. Schematic cross section of a typical process lens

Figure 4


Shutter
Aperture
Lens elements

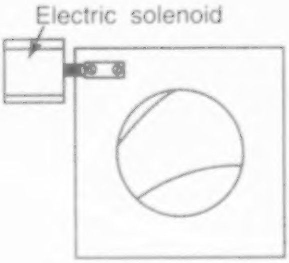
c. View from inside camera

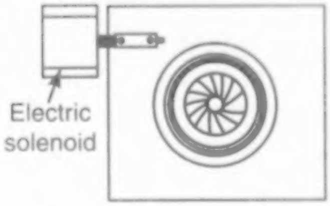
- Shutter mechanism closed

  Figure 5

- Shutter mechanism open

  Figure 6


Electric solenoid


Electric solenoid

**Objective 8**

## Characteristics of an aperture

a. Located inside lens barrel

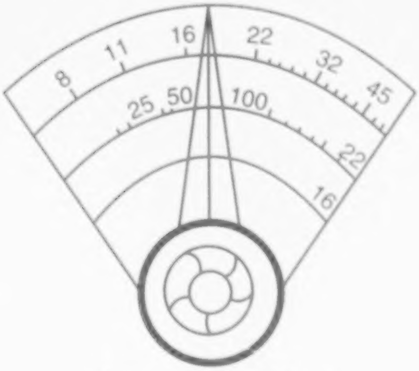
b. Made up of several metal blades that form a circular opening

c. Controls quantity of light striking the film

d. A change in *f*/stop will change the aperture size

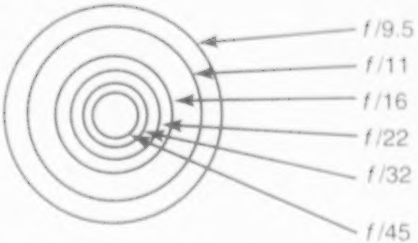
Example: Changing the *f*/stop to the next higher number will reduce the light by exactly one-half. Changing the *f*/stop to the next lower number will double the amount of light. To simplify this concept think of the *f*/stop as a fraction; $^1/_{22}$ is a smaller fraction than $^1/_{16}$. Thus *f*/16 will allow twice the amount of light to pass through the lens.

Figure 7



Aperture: Front View

Figure 8



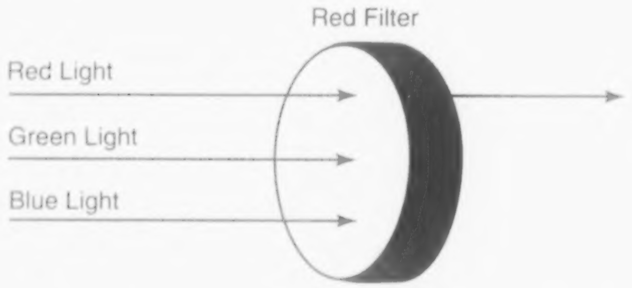
Relative Sizes of Aperture Openings

**Objective 9**

## Functions of filters

a. Allow light of the same color as the filter to pass through while holding back the other two color components of white light

Figure 9



b. Used to drop a color in the final reproduction and therefore photograph copy as white

c. May be used to hold a color in the final reproduction and therefore photograph copy as black

Note: The following table shows suggested film and filter combinations for photographing color copy.

| To Hold a Color | | Color of Copy | To Drop a Color | |
|---|---|---|---|---|
| Orthochromatic | Panchromatic | | Orthochromatic | Panchromatic |
| Orange (16) | Green (61, 58) | Magenta | Blue (47B) | Red (25) |
| Blue (47B) | Blue (47B) | Red/Orange | N/R | Red (29) |
| Blue (47B) | Blue (47B) | Yellow | Orange (16) | Red (29) |
| Blue (47B) | Magenta (30) | Green | Orange (16) | Green (58) |
| N/R | Red (25) | Cyan | No filter needed | Blue (47B) |
| Orange (16) | Green (58) | Blue | Magenta (30) | Blue (47B) |

**Objective 10**

## Assignment Sheet 1—Apply an Exposure Rule for Different Steps on the Gray Scale

Name ____________________ Overall Rating __________

Date ____________________

| Evaluation Criteria | Rating |
|---|---|
| • Directions were followed | ______ |
| • Answers are correct | ______ |

**Basic Skills**

Reading

Mathematics

**Introduction**

In order to compensate for many different types of copy typically shot on a process camera, the camera operator must have an understanding of the effects of exposure in relation to the steps on a photographic gray scale.

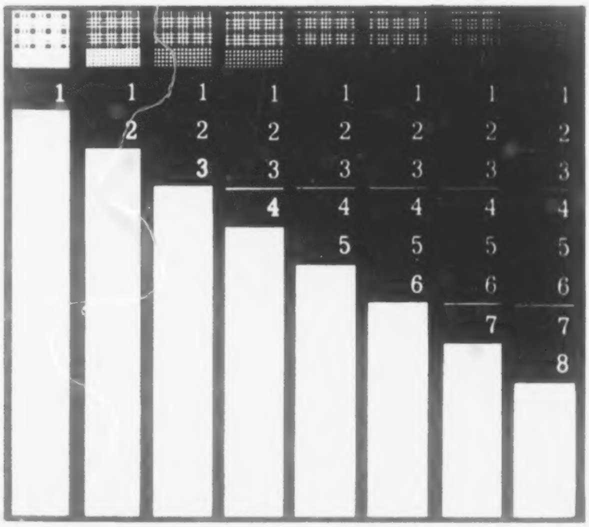
**Directions**

Write the necessary exposures on the lines at the top of each scale. In each case, the exposure is given that would yield a solid step 4 on the gray scale.

A.

Figure 1

___ ___ ___ 16 ___ ___ ___ ___



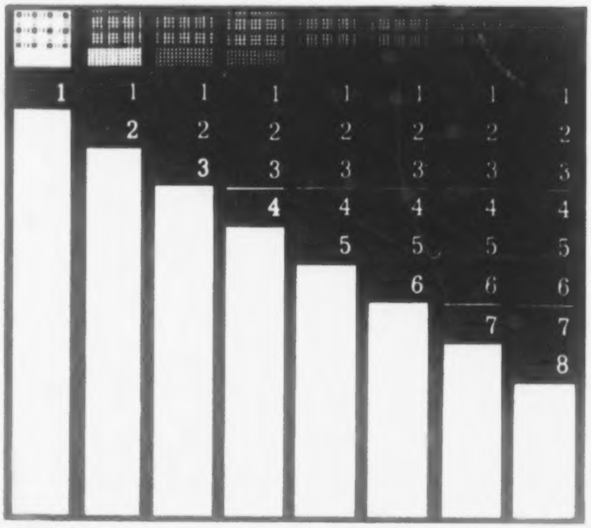
Courtesy Stouffer Graphic Arts Equipment Company

## Assignment Sheet 1

B.

Figure 2

___ ___ ___ *20* ___ ___ ___ ___



Courtesy Stouffer Graphic Arts Equipment Company

**Objective 11**

## Job Sheet 1—Set Up a Process Camera and Determine Exposures

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Correctly determined basic exposure based on a solid step 4 on the gray scale | ______ |
| • Correctly completed exposure chart for variations in size and quality based on basic exposure | ______ |

**Basic Skills**

Reading Mathematics Critical Thinking Employability Technology

**Introduction**

A process camera operator must be able to determine exposure on a wide variety of "originals," therefore they must be able to understand and operate the process camera, making proper adjustments in exposure based on size and quality of original copy. This exercise will give the student experience in the use of the process camera.

Note: The instructor may also use this job sheet to illustrate examples in the areas of filters, reductions, enlargements, and problem copy.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Process camera
- 12-step reflection gray scale
- 10-power magnifier
- Darkroom timer
- Squeegee
- Graphic arts film

**Procedure**

☐ 1. Prepare darkroom.

☐ 2. Make sure the copyboard is clean.

Note: Use an approved graphic arts glass cleaner.

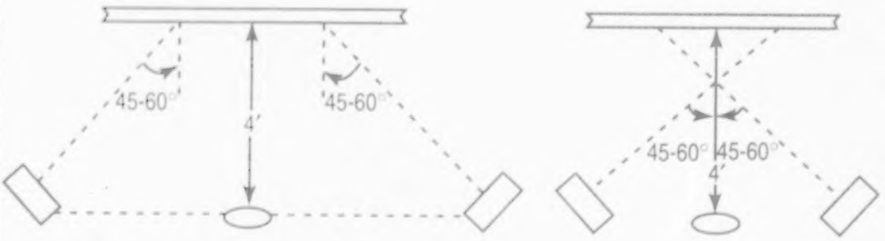
☐ 3. Make sure the lens is clean by visual observation.

Note: **Do not attempt to disassemble** or clean the lens. If it is necessary to clean the lens, ask your instructor.

☐ 4. Position camera lights to give more illumination to the four corners of the copyboard than to the center (Figure 1).

Note: The angle formed by an imaginary line from lens to copyboard and the camera lights will vary on cameras, but will generally fall between 45 and 60 degrees.

Figure 1



Courtesy Eastman Kodak Company

☐ 5. Adjust camera lights to avoid any direct reflection from the glass of the copyboard.

☐ 6. Make sure the lens is not reached by any light source other than camera lights.

Note: The lens and film must be protected from lights that are not part of the image, such as room light, window light, reflected light from bright objects, or misplaced copy lights. These nonimage lights will cause flare and degrade the quality of the negative. A lens hood is usually effective.

☐ 7. Select samples of the following line copies:

- Phototypeset
- Typewriter
- Line illustrations

☐ 8. Fasten small strips of the line copies on a cardboard.

☐ 9. Place copyboard in the horizontal position and raise the glass cover.

☐ 10. Place the sample copies on the center of the copyboard.

☐ 11. Place a 12-step reflection gray scale next to the copy on the copyboard and close the copyboard.

☐ 12. Return copyboard to vertical position.

☐ 13. Use a lens opening of *f*/22 for the test exposure.

☐ 14. Set the camera controls on 100% (same size) reproduction.

☐ 15. Set the camera timer to make a 10-second exposure.

☐ 16. Place a sheet of graphic arts film on the center of the camera back with the emulsion side up.

Note: Always handle film by the edges.

☐ 17. Turn on the vacuum and close the camera back.

☐ 18. Make an exposure by starting the timer.

☐ 19. Turn the vacuum off and remove the film.

☐ 20. Set the darkroom timer for recommended development time (usually 2:30–2:45).

☐ 21. Start the timer and drag the film emulsion side down through the developer and then quickly flip it over.

Note: Agitate the developer continuously by raising the left side of the tray and lowering it, then raising the right side of the tray and lowering it, then raising the front of the tray and lowering it. Continue this procedure until the time has elapsed.

☐ 22. Remove film from developer and hold it on top of tray to drain for approximately 5 seconds.

☐ 23. Place film in stop bath quickly and agitate vigorously for approximately 15 seconds.

☐ 24. Place film in fixer and agitate for approximately 2 minutes or twice the length of time it takes for the image area to clear.

☐ 25. Wash film for recommended time.

Note: For this test exposure, simple rinsing will be sufficient.

☐ 26. Squeegee the film and hang it to dry.

☐ 27. Place the negative on a light table and examine the gray scale.

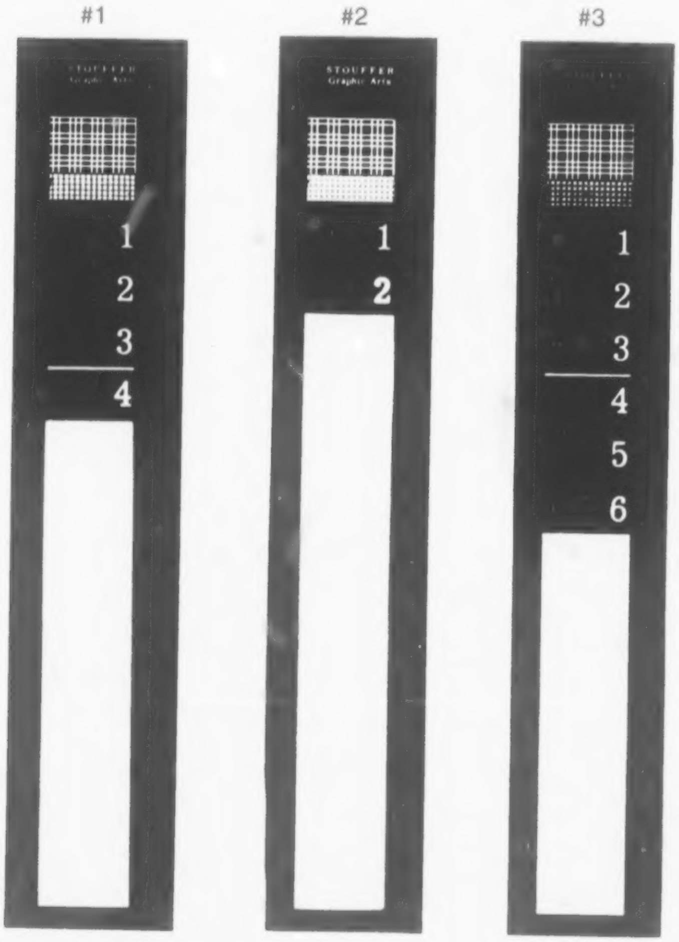
Examples: A black step 4 indicates that the negative is probably good. The negative area is either clearly transparent or densely opaque. The edges of the letters are sharp and details are true to the original. See gray scale #1 in Figure 2.

A black step 3 or lower indicates that the negative is underexposed. Although the clear areas are transparent, the opaque areas have low density and many pinholes, and details are thicker than the original. See gray scale #2 in Figure 2.

A black step of 5 or higher indicates that the negative is overexposed. Although dense areas are opaque, density appears in some areas that should be clear and the type shows loss of fine details. See gray scale #3 in Figure 2.

Note: When checking quality of image on the negative always use a magnifier and compare the same area or character on the original copy and the negative.

Figure 2



10 Seconds Correctly Exposed

5 Seconds Underexposed

20 Seconds Overexposed

Courtesy Stouffer Graphic Arts Equipment Company

☐ 28. Adjust exposure if necessary.

Note: Although in the example, 10 seconds gave a solid step 4, it should be pointed out that 10 seconds is not the magical number that works in all situations. The combination of the camera, lighting system, film and developer all affect the exposure/development process. It is important to remember that all exposure may be adjusted to give the required step 4 on the gray scale.

☐ 29. Calculate exposure changes required for variations in copy size and quality.

Note: Although a solid 4 on the gray scale may indicate a desirable exposure for normal copy, other types of copy may be exposed for one or two steps less than 4 or some copy may be exposed for one, two, or three steps more than 4. Two factors that determine how copy is exposed are quality of the original copy and the size of reproduction of the original copy.

- Study the completed chart in Figure 3.

Note: In order to interpret the chart, locate 4 black located horizontally with **normal copy** and vertically with 40–120%. The normal exposure in this example is 20 seconds for a solid 4. To interpret the rest of the chart, simply remember the concept, every 2 steps on the gray scale equal twice or one-half as much exposure depending on whether the scale is reading up or down.

Figure 3

| Density of Copy | Size of Copy | | |
|---|---|---|---|
| | 10–40% | 40–120% | 120–400% |
| **Extra Heavy Copy** | | | |
| Black bold type<br>Etching proofs<br>Photo proofs | 4<br>Black<br>20 sec. | 5<br>Black<br>30 sec. | 6<br>Black<br>40 sec. |
| **Normal Copy** | | | |
| Good black type proofs with fine serifs<br>Pen and ink drawings<br>Printed forms | 3<br>Black<br>15 sec. | 4<br>Black<br>20 sec. | 5<br>Black<br>20 sec. |
| **Light Copy** | | | |
| Gray copy<br>Ordinary typewritten sheets<br>Printed forms/light lines<br>Good pencil drawings | 2<br>Black<br>10 sec. | 3<br>Black<br>15 sec. | 4<br>Black<br>20 sec. |
| **Extra Light Copy** | | | |
| Extra fine lines<br>Pencil drawings<br>Extra light gray copy | 1–2<br>Black<br>8 sec. | 2<br>Black<br>10 sec. | 3<br>Black<br>15 sec. |

Courtesy Stouffer Graphic Arts Equipment Company

☐ 30. Check the test negative that you made for the basic main exposure (that exposure which gives a solid step 4 on the gray scale).

## Job Sheet 1

☐ 31. Write your basic main exposure under **4 black** opposite **normal copy** in the blank chart (Figure 4).

☐ 32. Complete the chart by applying the exposure rule.

Figure 4

| **Density of Copy** | | **Size of Copy** | |
|---|---|---|---|
| | **10–40%** | **40–120%** | **120–400%** |
| **Extra Heavy Copy**<br>Black bold type<br>Etching proofs<br>Photo proofs | 4<br>Black | 5<br>Black | 6<br>Black |
| **Normal Copy**<br>Good black type proofs with fine serifs<br>Pen and ink drawings<br>Printed forms | 3<br>Black | 4<br>Black | 5<br>Black |
| **Light Copy**<br>Gray copy<br>Ordinary typewritten sheets<br>Printed forms/light lines<br>Good pencil drawings | Black | 2<br>Black | 34<br>Black |
| **Extra Light Copy**<br>Extra fine lines<br>Pencil drawings<br>Extra light gray copy | 1–2<br>Black | 2<br>Black | 3<br>Black |

Courtesy Stouffer Graphic Arts Equipment Company

☐ 33. Clean work area; return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________

______________________________

## Unit Contents

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## Objective Sheet

**Unit Objective**

After completing this unit, the student should be able to set up a process camera to do the following halftone procedures: make a halftone negative, make a fake duotone, make a duotone, and rescreen a halftone illustration. The student should demonstrate these competencies by completing the assignment sheet and job sheets and by scoring a minimum of 85 percent on the written test.

**Specific Objectives**

After completing this unit, the student should be able to:

1. Match terms related to halftone photography with their definitions.
2. Match types of contact screens with their descriptions.
3. Select true statements concerning the care of contact screens.
4. Complete statements concerning halftone dot percentages.
5. Select true statements concerning procedures for avoiding moires in rescreening.
6. Identify halftone dot percentages. (Assignment Sheet 1)
7. Program a Q15 exposure computer and make a halftone negative. (Job Sheet 1)
8. Make a duotone. (Job Sheet 2)
9. Make a fake duotone. (Job Sheet 3)
10. Rescreen a halftone illustration. (Job Sheet 4)

## Information Sheet

Objective 1

### Terms and definitions

a. **Contact screen**—A precision pattern of vignetted dots on a flexible base material used in direct contact with the film

b. **Densitometer**—An instrument for making density measurements

c. **Density**—A numerical measure of the blackening or light-stopping ability of a photographic image

d. **Duotone**—A two-impression reproduction using two halftones of the same original

Note: One halftone is normally black and the other is another color. However, both halftones may be black. The screen angle of the halftones must be 30 degrees apart.

e. **Fake duotone**—A two-impression reproduction, with a halftone which is overprinted on a color block

Note: A fake duotone is also called a *duograph*.

f. **Flash exposure**—A nonimage exposure made through the contact screen to the film; used to increase dot size in the shadow area of the halftone

g. **Halftone**—A converted image of a continuous tone copy that consists of solid dots of equal density but varying sizes

h. **Halftone dot**—An individual dot of printed ink; groups of dots represent percentage of ink coverage on the printed sheet

Note: Percentage of ink coverage varies drastically from the highlight to the shadow.

i. **Halftone screen**—Used in the light path between the lens and film to break the continuous tone copy into a dot pattern for reproduction

Note: There are two classifications of halftone screens, glass screens and contact screens, but only the contact screen will be discussed and used in this section.

j. **Main exposure**—A detail exposure made through the lens of the camera, with the contact screen in place with only the camera lights

k. **Moire**—An objectionable wavy effect produced when screens are overprinted at an incorrect angle

l. **Neutral density filter**—A gray-colored filter used to uniformly reduce all colors of light

Note: Neutral density filters are also referred to as *ND filters* and are typically used with a bump exposure.

m. **No-screen exposure**—An exposure made by exposing the film to the copy without the contact screen

Note: The no-screen exposure is also called *highlighting* or *bump exposure.*

n. **Rescreening**—Screening of a printed halftone illustration

o. **Screen ruling**—The number of lines per inch on a halftone screen

Note: Higher number screen rulings will reproduce finer details. Screen rulings range from 65 to 300 lines, with the most common rulings being 65, 85, 100, 120, 133, and 150 lines.

Objective 2

## Types of contact screens and their descriptions

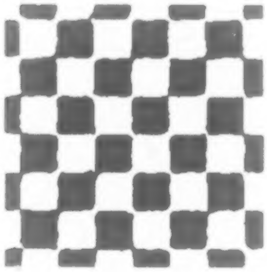
a. Gray contact screen—A silver emulsion screen that does not require magenta color for control of tone reproduction

Note: This is the most popular and easiest screen to use. A controlled flash exposure is recommended for adjusting halftone contrast.

b. Magenta contact screen—A dyed screen whose tone reproduction characteristics can be altered with the use of magenta and yellow filters

c. Conventional dot screen—A screen that produces square middletone dots that join all four corners as the dots reach 50 percent

Figure 1



Conventional (Square) Dots

Courtesy Eastman Kodak Company

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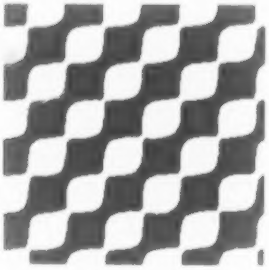
d. Elliptical dot screen—A screen that produces football-shaped middletone dots that join only two opposite corners as the dots reach 50 percent

Figure 2



Elliptical Dots

Courtesy Eastman Kodak Company

Objective 3

## Care of contact screens

a. Protect screens from dirt, dust, fingerprints, scratches, and other damage.

b. Keep the screen flat and in its original folder when not in use.

c. Dust the screen when necessary by wiping it lightly with a clean dry photo chamois.

d. Clean water spots only with film cleaner.

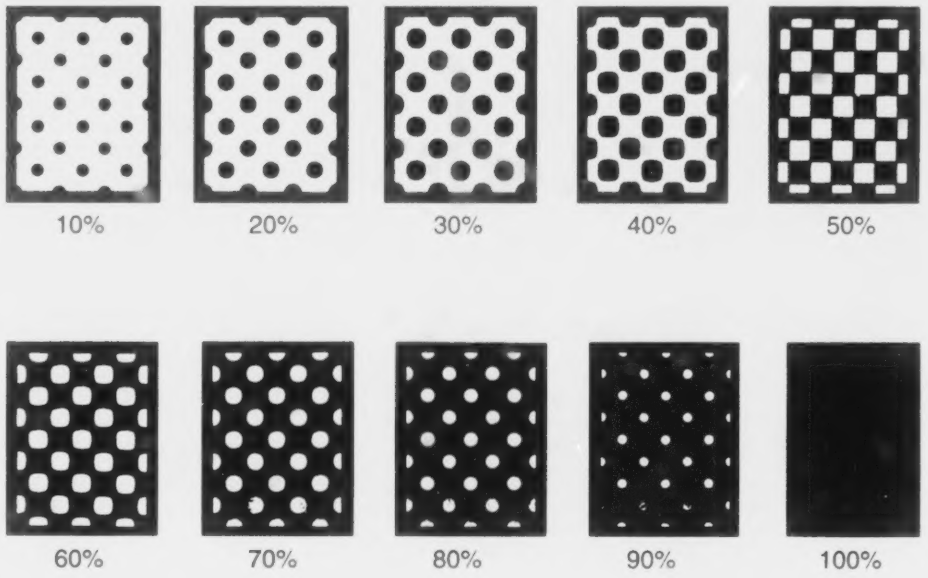
Objective 4

## Halftone dot percentages

a. Halftone dots are described in terms of percentage of ink coverage on the printed page.

Note: The illustration on the following page shows the various halftone dot percentages used to reproduce a typical range of tones found on a continuous-tone photograph.

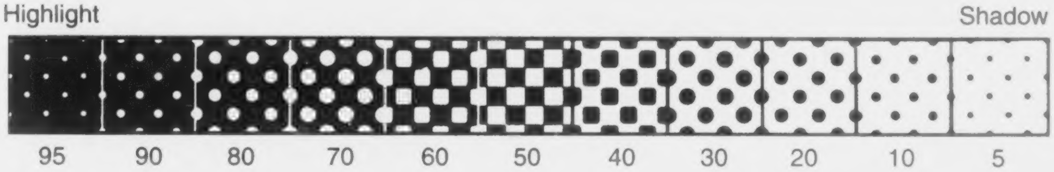
Figure 3


10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

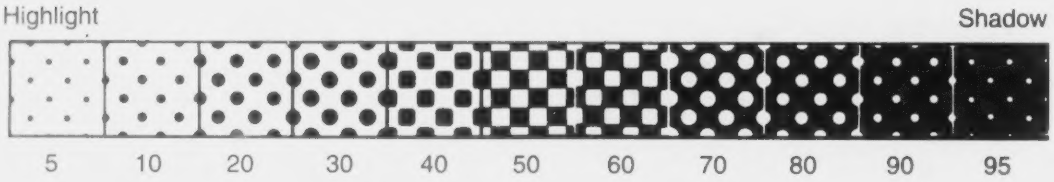
Courtesy Eastman Kodak Company

b. Dot percentages as they appear on the printed page are exactly opposite of how they appear on the halftone negative.

Figure 4


Highlight
Shadow
95
90
80
70
60
50
40
30
20
10
5

Appearance of Dots on a Halftone Negative


Highlight
Shadow
5
10
20
30
40
50
60
70
80
90
95

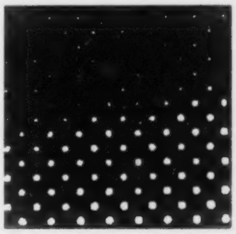
Appearance of Dots on a Printed Page

Courtesy Eastman Kodak Company

c. The highlight area of a halftone typically prints 10 percent ink coverage with 90 percent white reflected from the page, thus the eye sees primarily white.

Note: The facsimile of the negative section shown in the example below shows the size of typical highlight dots as they would appear on the halftone negative. The dense black area contains small clear openings. Highlight dots typically range from a small pinpoint dot to a 10 percent dot.

Figure 5

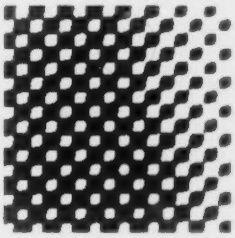


Courtesy Eastman Kodak Company

d. The middletone areas appear to be gray because the 50 percent ink coverage and 50 percent white reflected from the page are blended by the eye.

Note: The facsimile of the negative section shown in the example below shows the size of middletone dots as they would appear on the halftone negative. Middletone dots typically range from 40 to 60 percent with a 50 percent dot being the actual dot used for middletone identification purposes.

Figure 6

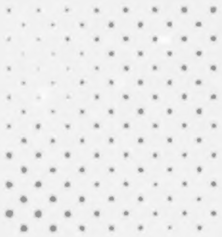


Courtesy Eastman Kodak Company

e. The shadow area of a halftone typically prints 90 percent ink coverage with only 10 percent white reflected from the page, thus the eye sees primarily black in the shadow area of a printed halftone.

Note: The facsimile of the negative section shown in the example below shows the size of shadow dots as they would appear on the halftone negative. The shadow dot area has the least amount of density in the halftone negative with only small black dots appearing. Shadow dots typically range from 90 percent down to the smallest printable dot, which is usually about 95 to 98 percent.

Figure 7



Courtesy Eastman Kodak Company

f. Quarter-tone dots bridge the highlight to the middletone dots and typically range from 20 to 30 percent, while three-quarter tone dots bridge the middletone to the shadow area and typically range from 70 to 80 percent.

**Objective 5**

**Procedures for avoiding moires in rescreening**

Note: Making a halftone negative from a printed halftone illustration may cause a moire.

a. Angle the contact screen or copy 30 degrees.

b. Use a magnifier while viewing the image on the ground glass and adjust the copyboard control to make a slight shift in focus that will blur the halftone dots.

Note: If done correctly, this procedure causes the existing halftone dots to be rescreened without a moire. The out-of-focus halftone dots have little or no effect on the overall photo illustration.

c. Use a screen which has a screen ruling of 50 lines coarser or finer than the copy.

d. Hold a clean piece of glass in front of the lens, and tilt it back and forth during exposure.

e. If size requirements permit, original may be reduced to less than 40 percent.

**Objective 6**

## Assignment Sheet 1—Identify Halftone Dot Percentages

Name ______________________ Overall Rating __________

Date ______________________

| Evaluation Criteria | Rating |
|---|---|
| • Directions were followed | ______ |
| • Areas of halftone are correctly circled and labeled | ______ |

**Basic Skills**

Reading

**Introduction**

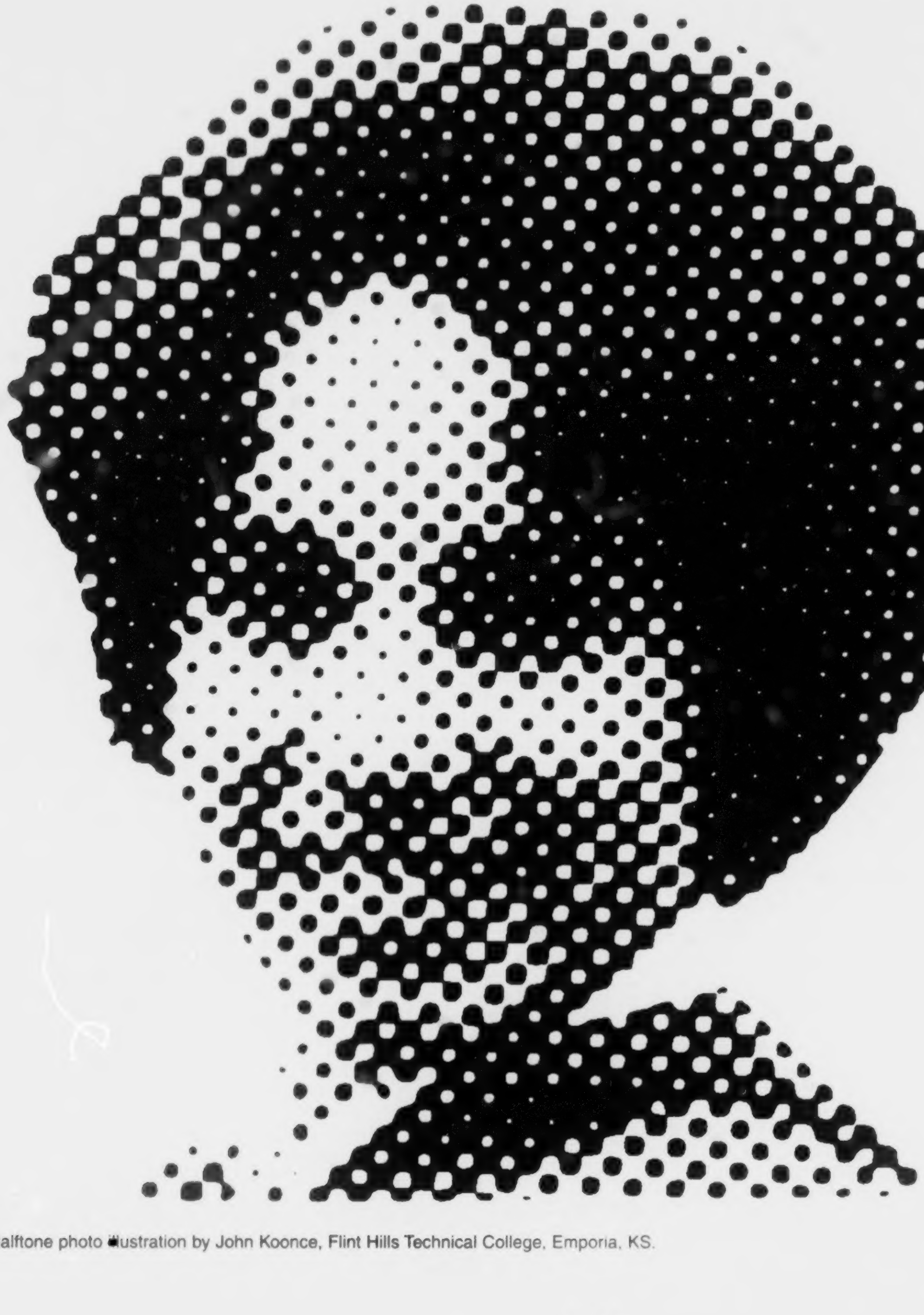
In order to produce halftone images according to industry standards, you must be able to identify halftone dot sizes that represent important control points (highlight, middletone, and shadow) in the reproduction of halftones.

**Directions**

Use the enlarged section of the printed halftone image on the next page to identify a 10 percent highlight dot, a 50 percent middletone dot, and a 90 percent shadow dot. Circle the area you choose to represent each dot area, then draw a line out into the margin of the page and write the dot percentage.

Note: Have someone hold up the photo illustration while you look at it. Turn around and walk away 25 feet or so, then look at the photo illustration again. What you will see is the difference between looking at halftone dots by using a magnifier versus what you typically see when you look at a picture on the printed page.

## Assignment Sheet 1



Halftone photo illustration by John Koonce, Flint Hills Technical College, Emporia, KS.

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**Objective 7**

## Job Sheet 1—Program a Q15 Exposure Computer and Make a Halftone Negative

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Darkroom was prepared correctly including chemical temperature and processing times | ______ |
| • Halftone negative was properly exposed and developed to yield a 5-10 percent highlight dot and a 90-95 percent shadow dot | ______ |

**Basic Skills**

Reading Mathematics Critical Thinking Employability Technology

**Introduction**

Although many firms are bypassing process cameras in favor of sophisticated "computer-to-plate" technology, many print shops will be using process cameras for years to come. This exercise will allow the student to begin basic process camera work to produce a halftone negative.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Kodak Q15 Exposure Computer
- Kodak 24-Step Reflection Density Guide, Q16
- Reflection densitometer (optional)
- Magnifier (10X)
- Contact screen
- Litho film (8 x 10 or 10 x 12)
- A continuous tone copy with normal contrast (a good black-and-white photograph)
- Process camera and other darkroom equipment

**Procedure**

a. Make the test negative.

☐ 1. Set up darkroom and stabilize temperature.

☐ 2. Set up camera for a 100% reproduction.

- Set *f*/stop on *f*/16.
- Set timer.

Note: Use an exposure of approximately three times the normal exposure for a line negative. In this example we will use 30 seconds.

☐ 3. Place a Kodak Refection Density Guide (24 step) on the camera copyboard.

☐ 4. Place a sheet of 8 x 10 or 10 x 12 inch film that is normally used for halftone on the camera back.

☐ 5. Cover up approximately 1 inch of the edge of the film widthwise with a piece of cardboard and tape it down.

☐ 6. Place a contact screen, emulsion side down, over the film.

Note: To ensure good contact, the screen must be at least 1/2 inch larger than the film on all four sides.

☐ 7. Wipe the contact screen lightly with a photo chamois or rubber roller to work air bubbles out.

☐ 8. Make an exposure and open the camera back.

Note: Do not turn the vacuum off.

☐ 9. Uncover the covered area and cover the exposed area of the film with the contact screen in place.

☐ 10. Make series of flash exposures.

Note: Use a second piece of cardboard to step off a series of at least five 5-second exposures by moving the cardboard 1/2 inch each time.

☐ 11. Remove the contact screen and place it in its original container.

☐ 12. Process the test negative.

Note: All processing must be kept absolutely consistent.

☐ 13. Place the negative on a light table and examine the dot structure with a magnifier.

Note: The normal highlight dots should fall on step .00 or higher density of the gray scale. If they do not, another exposure must be made by doubling the exposure. Ask your instructor what the normal highlight dots should be. There will be no dots in the areas of the negative that represent the darkest steps of the gray scale, but dots do appear in lower density steps (shadow dots). Select the normal highlight and shadow dot, and note the density of the corresponding steps. In this example we will use the hypothetical numbers of .20 for highlight and 1.30 for shadow. Students should use the actual steps that produced the normal highlight and shadow dots.

☐ 14. Examine the flash exposures on the edge of the test negative, and select the step which produced a normal shadow dot.

Note: These dots should be the same size as the shadow dot on the gray scale.

☐ 15. Record the exposure time which produced this dot.

Note: This flash time becomes the basic flash exposure. If none of the steps show acceptable dot sizes, change the flash lamp distance and/or size of the bulb and repeat the process. In this example we will assume the 20-second step produced a normal shadow dot.

b. Program the computer.

☐ 1. Select the quadrant of the basic flash dial (clear) that corresponds with the basic flash exposure.

Note: In this example it is 20 seconds.

☐ 2. Cover all but the correct quadrant with the mask wheel.

☐ 3. Rotate the main exposure dial (M) until it is in line with the density of copy that produced the highlight dot.

Note: In this example it is .20.

☐ 4. Set "zero" of the basic flash quadrant opposite the density of gray scale that produced the shadow dots.

Note: In this example it is 1.30.

☐ 5. Secure the basic flash dial, mask wheel, and main exposure dial with a piece of tape, making sure the alignment has not changed.

☐ 6. Rotate the main exposure calibration tab so that the test negative exposure time appears in the window and is in line with the density that produced the highlight dots.

Note: In this example it is 30 seconds.

☐ 7. Fasten the tab to the base of the computer; the computer is now programmed.

c. Use the computer with a gray contact screen and Kodalith Autoscreen.

☐ 1. Obtain the highlight and shadow densities of the copy.

Note: Use a Kodak Reflection Density Guide or a reflection densitometer. In this example we will use a highlight density of .25 and shadow density of 1.55. Students should use the actual densities of the copy.

☐ 2. Rotate M to the highlight density of the copy.

☐ 3. Set pointer F at the shadow density of the copy.

☐ 4. Select the red correction arrow which is closest to pointer F.

☐ 5. Move pointer F to the head of the correction arrow.

☐ 6. Rotate the flash quadrant dial the length of the arrow.

☐ 7. Reset F at the copy shadow density.

☐ 8. Read the main exposure time in the window.

☐ 9. Read the flash exposure time at pointer F.

Note: In this example, the main exposure is 33 seconds and the flash exposure is 6 seconds.

d. Use the computer with a magenta contact screen.

☐ 1. Obtain the highlight and shadow density of the copy.

☐ 2. Rotate M to the highlight density of the copy.

☐ 3. Set pointer F at the shadow density of the copy.

☐ 4. Read the main exposure time in the window.

☐ 5. Read the flash exposure time at pointer F.

Note: Do not use correction arrows when using magenta contact screens.

e. Program the computer for no-screen (bump) exposure.

☐ 1. Make a second test negative with the same contact screen, same film, and same exposure.

Note: Do not turn the vacuum off.

☐ 2. Remove the contact screen.

Note: This should be done carefully so the film does not move.

☐ 3. Make a second exposure on the same piece of film.

Note: If a gray contact or magenta negative screen is used, the exposure time should be 5 percent of the exposure for the first test negative. If a magenta positive screen is used, the exposure time should be 10 percent. In this example we assume 5 percent. The first test negative had a 30-second exposure. Five percent of 30 seconds is 1 1/2 seconds. If the process camera is not equipped with an accurate timer, a neutral density filter should be used. Ask the instructor for the proper value.

☐ 4. Process and dry the negative.

☐ 5. Locate the step on the gray scale that produced a suitable highlight dot only.

Note: The highlight dot will be in a higher density step; assume it is .45.

☐ 6. Determine the difference between the density of the step that produced the highlight dot in test negative No. 1 and test negative No. 2.

Note: In this example .45 – .20 = .25.

☐ 7. Refer to the no-screen calibration table on the back of the computer.

Note: For convenience, the numbers from one of the vertical columns of the table will be transferred to the no-screen scale of the computer. To determine which column to use, read down the left-hand side of the table to the density difference. Read across to the percentage of no-screen exposure that was used.

☐ 8. Read down the left-hand side of the table (highlight difference) to the density difference (Figure 1).

☐ 9. Read across to the percentage of no-screen exposure that was used (Figure 1).

Note: Where these two figures intersect (Figure 1), transfer the numbers from this column to the front of the computer opposite their density equivalents on the no-screen scale (Figure 2). The computer is now calibrated for no-screen exposure.

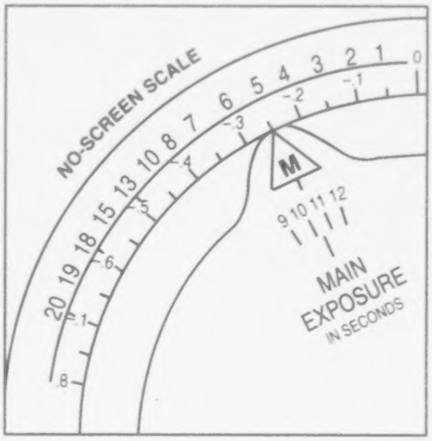
Figure 1

NO-SCREEN CALIBRATION TABLE

| Highlight Difference | Percentage No-Screen Exposure | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 05 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 |
| 10 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 |
| 15 | 7 | $\boxed{5}$ | 5 | 4 | 4 | 3 | 3 | 2 |
| 20 | 10 | 8 | 7 | $\boxed{5}$ | 5 | 4 | 4 | 3 |
| 25 | 15 | 10 | 8 | 7 | 6 | $\boxed{5}$ | 5 | 4 |
| 30 | 20 | 13 | 10 | 8 | 7 | 6 | 6 | 5 |
| 35 | | 16 | 12 | 10 | 8 | 7 | 7 | 6 |
| 40 | | 20 | 15 | 13 | 10 | 8 | 8 | 7 |
| 45 | | | 18 | 15 | 13 | 10 | 9 | 8 |
| 50 | | | 20 | 18 | 15 | 13 | 10 | 9 |
| 55 | | | | 19 | 18 | 15 | 13 | 10 |
| 60 | | | | 20 | 19 | 18 | 15 | 13 |
| 65 | | | | | 20 | 19 | 18 | 15 |
| 70 | | | | | | 20 | 19 | 18 |
| 75 | | | | | | | 20 | 19 |
| 80 | | | | | | | | 20 |

Courtesy Eastman Kodak Company

Figure 2



f. Use the computer for no-screen exposures.

☐ 1. Select the areas of the copy where a highlight and shadow dot should be placed.

Note: In this example we assume a highlight density of .10 and shadow density of 1.65.

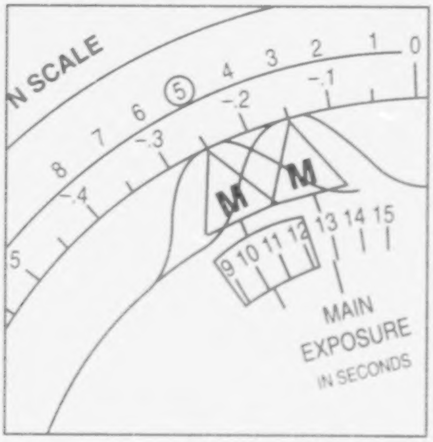
☐ 2. Rotate M to the percentage of no-screen exposure to be used for that copy (Figure 2).

Note: In this example it is 5.

☐ 3. Rotate M clockwise the distance of the highlight density of the copy (Figure 3).

Note: Do not rotate M if the highlight density of the copy is .00.

Figure 3



Courtesy Eastman Kodak Company

☐ 4. Read the main exposure in the window (Figure 3).

Note: In this example it is 13 seconds.

☐ 5. Set Pointer F at the shadow density.

Note: Correction arrows are not used. The exposure times for this copy will be:

Main exposure—13 seconds
No-screen exposure—13 seconds with a 1.30 ND filter
Flash exposure—17 seconds

☐ 6. Using the above procedures, make a halftone negative.

☐ 7. Evaluate the negative and show it to the instructor.

☐ 8. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________

______________________________

**Objective 8**

## Job Sheet 2—Make a Duotone

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Proper exposure determination and film processing for duotone negatives used to give proper dot percentages | ______ |
| • Color proof of duotone showed adequate contrast, was in register and colors were shown in proper sequence when mounted on card stock | ______ |

**Basic Skills**

Reading Mathematics Critical Thinking Employability Technology

**Introduction**

Duotones are a useful printing product to provide customers a striking printing job at a lower cost than four-color printing. This exercise allows the student to gain experience in exposing duotone negatives and making proofs of them.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Process camera
- Darkroom equipment
- Contact screen
- Continuous tone copy
- Halftone film
- Register marks
- A sheet of index or chipboard (larger than copy)
- Black photographic tape (black masking tape)
- Color key or other color proofing material and developer
- Protractor and ruler

**Procedure**

a. Make a template for angling copy on the index or chipboard (Figure 1).

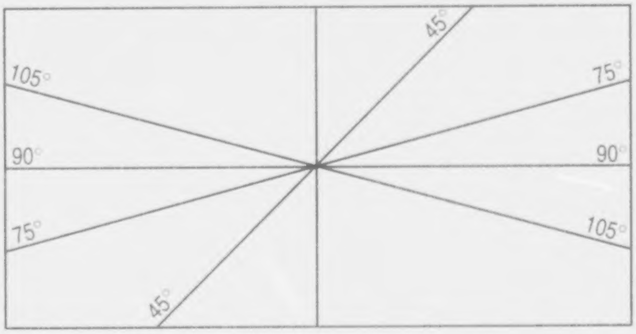
☐ 1. Draw a vertical line through the center of chipboard, and mark this line 0°.

☐ 2. Place zero line of the protractor on this line and mark off 45°, 75°, 90°, and 105°.

☐ 3. Draw lines from these points through the center of the zero line to the edge of the chipboard.

Note: Only 45° and 75° lines will be used in the job sheet. However, this template should be saved for use in rescreening and in the color separation unit.

Figure 1



b. Make a duotone.

☐ 1. Place register marks on the copy.

Note: Place at least two of them at opposite ends of the copy. If they cannot be placed on the copy, mount the copy on a larger board.

☐ 2. Mark the centerline of the copy at both top and bottom.

Note: These lines will be used to line up the copy with the lines on the chipboard.

☐ 3. Tape the copyboard mat down securely to the metal copyboard frame.

☐ 4. Tape the chipboard securely to the center of copyboard mat.

☐ 5. Place the copy in the center of chipboard, and line it up with the 45° line.

☐ 6. Tape the copy down securely.

☐ 7. Set the camera to required size.

☐ 8. Position the contact screen as straight as possible on the vacuum back where it would normally go.

☐ 9. Place strips of black photographic tape as guides at the corner edges of the screen.

☐ 10. Determine what size film is needed.

Note: Since the copy is angled on the copyboard, a larger sheet of film is required.

☐ 11. Place tape guides on the vacuum back to guide the film in position.

☐ 12. Make the exposure and process the film.

Note: Refer to Job Sheet 1 in this unit. This should be basically a normal negative. A 15 to 20 percent flash exposure is added to keep shadows from printing solid black.

☐ 13. Open the copyboard slowly and rotate the copy to line up with the 75° line.

☐ 14. Tape the copy down securely and gently close the copyboard.

☐ 15. Place another sheet of film in the same position as before.

☐ 16. Position screen in exactly the same position as before.

☐ 17. Expose and process the film.

Note: Reduce the main exposure by 10 to 20 percent and eliminate the flash. The result should be a flat-looking halftone in the highlight area, and little or no dots in the shadows.

☐ 18. Register the two negatives.

Note: If the negatives cannot be registered, or if there is evidence of a moire, carefully review the steps and ask the instructor for help. If the negatives do register and have no evidence of moire, ask the instructor if it should be proofed. To proof a duotone continue with the steps below.

☐ 19. Make a color proof of the black negative (45°) on a sheet of color key or other proofing material.

☐ 20. Make a contact proof of the color negative on a sheet of color key or other proofing material.

☐ 21. Process, wash, and dry the proofs.

☐ 22. Register the two proofs and tape them down. Be sure to put the color proof on the bottom and the black proof on top.

☐ 23. Clean work area and return equipment to proper storage.

Evaluator's Comments: ______________________________

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**Objective 9**

## Job Sheet 3—Make a Fake Duotone

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Proper exposure given to provide appropriate dot percentages in halftone negative | ______ |
| • Technique used in color proofing provided good register, appropriate color balance and no signs of a moire between halftone and screen tint | ______ |

**Basic Skills**

Reading Mathematics Critical Thinking Employability Technology

**Introduction**

Duotones are a useful printing product to provide customers a striking printing job at a lower cost than four-color printing. This exercise allows the student to gain experience in manipulating process to render a duotone.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Process camera
- Darkroom equipment
- Contact screen
- Halftone film
- Register marks
- Illustration board
- Masking film
- Paste-up and stripping equipment
- Masking tape

**Procedure**

☐ 1. Mount the copy to the illustration board using masking tape.

☐ 2. Cut a piece of masking film large enough to extend 1/2 inch beyond the copy on all four sides.

☐ 3. Cut a straight line 1/2 inch down from the top of the masking film.

Note: Do not cut through the support base.

☐ 4. Remove the emulsion from the top strip.

☐ 5. Apply two register marks in diagonal corners of the copy on the illustration board.

☐ 6. Place the masking film on the copy and fasten down with a strip of masking tape across the top.

Note: Make sure the clear part of the masking film extends into the copy about 1/16 inch or less.

☐ 7. Draw the masking film down tightly and fasten the two lower corners.

☐ 8. Cut around the edge of the copy just inside the borders.

☐ 9. Peel off the masking film from all areas of the copy except the area covering the illustration.

☐ 10. Slide a sheet of white opaque paper under the masking film to cover the copy but not the register marks.

☐ 11. Set the camera to the required size and photograph this as a line copy.

Note: Use the same type of film that is to be used for halftone. The dimensional stability of film bases vary. Using two types of film could result in lack of registration.

☐ 12. Process the film.

Note: This negative will be used for the solid or tint block to be laid under the halftone.

☐ 13. Open the copyboard slowly, being careful not to jar the camera out of focus.

☐ 14. Remove the two pieces of masking tape from the lower corners of the overlay.

☐ 15. Swing the overlay back exposing the copy.

Note: Make sure the register marks are not covered and leave the overlay attached to the illustration board.

☐ 16. Carefully close the copyboard.

☐ 17. Place a sheet of halftone film on the vacuum back.

☐ 18. Position the screen as straight as possible on top of the film.

☐ 19. Make a normal halftone negative.

Note: Refer to Job Sheet 1.

☐ 20. Register the two negatives to see if they fit properly.

Note: The screen tint used for the second color must be angled 30° away from the angle of the halftone negative to prevent a moire.

☐ 21. Make a color proof of the black negative (45°) on a sheet of color key or other proofing material.

☐ 22. Make a contact proof of the color negative on a sheet of color key or other proofing material.

☐ 23. Process, wash, and dry the proofs.

☐ 24. Register the two proofs and tape them down. Be sure to put the color proof on the bottom and the black proof on top.

☐ 25. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________________________

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**Objective 10**

## Job Sheet 4—Rescreen a Halftone Illustration

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Darkroom and camera properly set up for rescreening halftones | ______ |
| • Halftone rescreened and checked for lack of moire | ______ |

**Basic Skills**

Reading Employability Technology

**Introduction**

This exercise will give the student an opportunity to make a halftone screen from an existing halftone with a minimum of moire.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Process camera
- Darkroom equipment
- Contact screen
- Halftone illustration
- Halftone film
- Magnifier
- Template for angling copy (refer to Job Sheet 2)

**Procedure**

Note: Several methods are used for rescreening. In this job sheet the copy will be angled at 30°. Ask the instructor if other methods should also be used.

☐ 1. Find the screen angle of the illustration.

Note: Use a screen angle finder or magnifier.

☐ 2. Place the template on the copyboard.

Note: This template was made in Job Sheet 2.

☐ 3. Place the illustration on the center of the template.

☐ 4. Angle the illustration 30° from its screen angle and fasten it to the template.

☐ 5. Make a normal halftone.

Note: Make sure the contact screen is straight on the vacuum board.

☐ 6. Process and dry the negative.

☐ 7. Examine the negative for the presence of moire.

Note: If there is moire in the negative, check the procedures and remake the negative.

☐ 8. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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# Unit 4 Other Darkroom Techniques

## Unit Contents

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## Objective Sheet

**Unit Objective**

After completing this unit, the student should be able to do a variety of related camera/darkroom tasks to include line, halftone and posterization techniques using diffusion transfer material; and posterization techniques using film and contacting procedures. The student should demonstrate these competencies by completing the job sheets and by scoring a minimum of 85 percent on the written test.

**Specific Objectives**

After completing this unit, the student should be able to:

1. Match terms related to darkroom techniques with their definitions.
2. Select true statements concerning the care of a diffusion transfer processor.
3. List materials and equipment necessary to make a diffusion transfer print.
4. Determine basic exposure and make a diffusion transfer line print. (Job Sheet 1)
5. Program a Q15 exposure computer and make a diffusion transfer halftone print. (Job Sheet 2)
6. Make a two-tone posterization using diffusion transfer material. (Job Sheet 3)
7. Make a three-tone posterization using special effects screen and diffusion transfer material. (Job Sheet 4)
8. Make a three-color posterization using graphic arts film. (Job Sheet 5)
9. Make a duplicate negative and a film positive using graphic arts film. (Job Sheet 6)
10. Make a spread and choke using graphic arts film. (Job Sheet 7)
11. Make a combination print with reversed type overprinted in a second color. (Job Sheet 8)

## Information Sheet

Objective 1

### Terms and definitions

a. **Activator**—A one-step, ready-to-use processing chemical used in a diffusion transfer processor

b. **Choke**—A contact process by which normal line images are made thinner without altering their shape or position; made from film positives

c. **Color key proofing material**—Clear sheeting with a colored light-sensitive coating; exposed to negatives to generate a colored proof of the image on the negative

d. **Combination print**—A halftone combined with reverse lettering

e. **Contact film**—A contact speed, thin base film used to make a film positive from a film negative

Note: Contact film may also be used to make a negative from a film positive.

f. **Copy dot**—Making a line negative of a screened halftone illustration

g. **Diffusion transfer**—A photographic process characterized by exposing a sheet of sensitized paper, processing the paper in contact with a receiver sheet, and peeling the two apart after a short waiting period to produce a usable image on the receiver

h. **Diffusion transfer negative paper**—A light-sensitive camera speed paper designed for use in a process camera

i. **Diffusion transfer receiver paper**—A non-light-sensitive, but chemically sensitive paper that accepts the transferred image as a positive print

j. **Diffusion transfer transparent receiver sheet**—A non-light-sensitive, but chemically sensitive material with a transparent base

k. **Duplicating film**—A contact speed, thin base film used to make duplicates of an original negative or positive

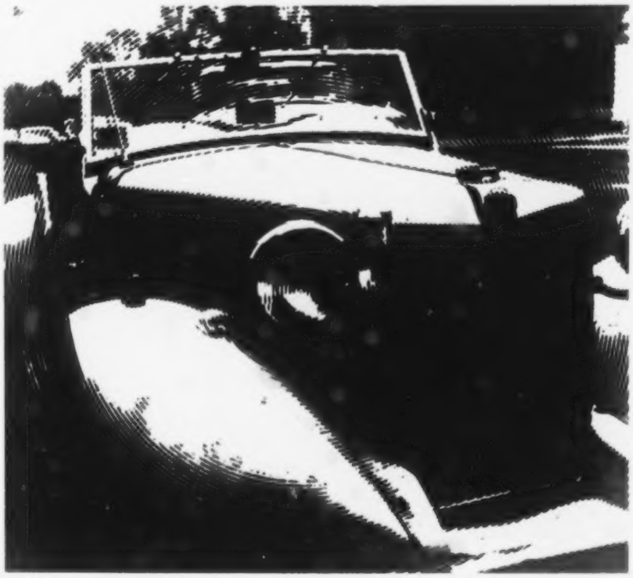
l. **PMT (photo-mechanical transfer)**—Trade name of diffusion transfer material marketed by the Eastman Kodak Company

m. **Posterizing**—The practice of compressing a full range of tones in a picture into a few flat tones

n. **Special effects screen**—A screen used in the photographic process to generate different patterns or textures within the photo reproduction; used to lend eye appeal to an illustration and lend a greater degree of creativity to the reproduction process

Note: In the following example, a concentric circle screen tint was used for a three-tone posterization to draw the eye to an accentuated area.

Figure 1



Courtesy ByChrome Company

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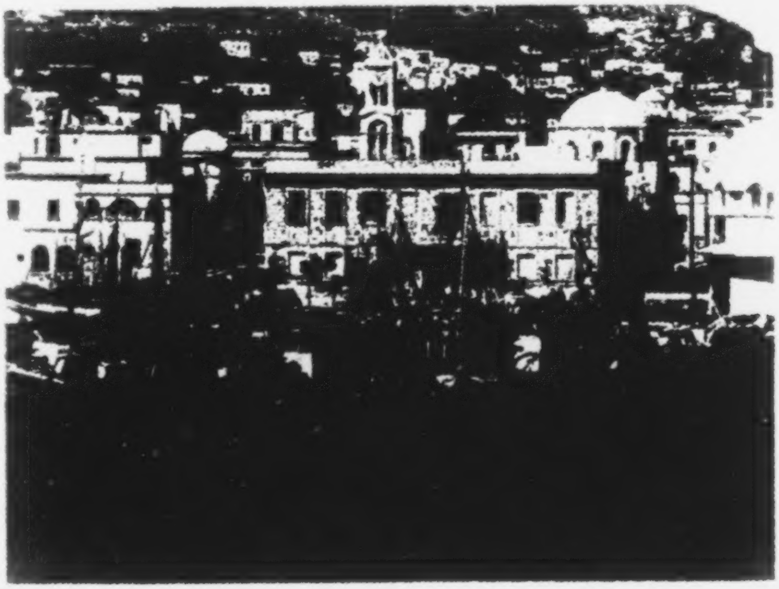
Note: In the following example, a subtle grainy-textured effect is achieved in a three-tone posterization by use of a fine mezzo 25% screen tint.

Figure 2



Courtesy ByChrome Company

o. **Spread**—A contact process by which normal line images are made fatter without altering their shape or location; made from film negatives

p. **Three-color posterization**—Three separate exposures reproduce three different areas of a photograph; using film, one negative is exposed for a solid step 2 on the gray scale, another negative is exposed for a solid 4 and the third negative is exposed for a solid 6 on the gray scale

q. **Three-tone posterization**—Essentially the same as a two-tone posterization but a second exposure is added using a screen tint which creates a third tonal value in the middletone area

r. **Two-tone posterization**—A line shot of a photograph which reduces the many tones found in the photo to a simple black-and-white illustration

# Information Sheet

**Objective 2**

## Care of a diffusion transfer processor

a. Clean the processor daily.

b. Drain activator into the storage container.

c. Remove and wash the tray with warm water.

d. Clean the processor rollers.

e. Dry and reassemble the processor.

**Objective 3**

## Materials and equipment necessary to make a diffusion transfer print

a. Diffusion transfer negative paper

b. Diffusion transfer receiver paper

c. Activator

d. Camera

e. Processor

**Objective 4**

## Job Sheet 1—Determine Basic Exposure and Make a Diffusion Transfer Line Print

Name ______________________ Attempt Number ______

Date ______________________ Overall Rating ______

| Evaluation Criteria | Rating |
|---|---|
| • Camera and diffusion transfer processor set up correctly | ______ |
| • Diffusion transfer negative properly exposed and processed | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Process camera
- Diffusion transfer processor
- Diffusion transfer activator
- Diffusion transfer negative paper
- Diffusion transfer receiver paper
- Stouffer 12-step reflection gray scale
- Sample copies of phototype, typewriter copy, and line illustrations
- Cardboard

**Procedure**

☐ 1. Set up camera.

Note: See Job Sheet 1, Unit 2.

☐ 2. Set up the diffusion transfer processor.

Note: Refer to instruction manual.

☐ 3. Fasten small strips of the sample line copies on a cardboard.

☐ 4. Place copyboard in the horizontal position and raise the glass cover.

☐ 5. Place the sample copies on the center of the copyboard.

☐ 6. Place the 12-step reflection gray scale next to the copy on the copyboard and close the copyboard.

☐ 7. Return the copyboard to vertical position.

☐ 8. Set the *f*/stop.

Note: Check with instructor if necessary.

☐ 9. Set the camera controls on 100% (same size) reproduction.

☐ 10. Set the camera timer to make a 10-second exposure.

☐ 11. Place a sheet of diffusion transfer negative paper on the center of the vacuum back with emulsion side up.

Note: Always handle the negative by the edges.

☐ 12. Turn on the vacuum and close the vacuum back.

☐ 13. Make an exposure by starting the timer.

☐ 14. Turn the vacuum off and remove the exposed negative.

☐ 15. Position the exposed diffusion transfer negative paper with its emulsion side up in contact with the coated side of the diffusion transfer receiver sheet.

Note: The dark side of the diffusion transfer negative is the emulsion side. The coated side of the receiver sheet has no visible marks or printing.

☐ 16. Align the negative and receiver combination on the feed tray of the diffusion transfer processor.

Note: Follow processor manufacturer's recommendation on proper method of feeding the paper.

☐ 17. Feed negative and paper into the processor.

Note: Make sure the negative paper goes under the separator fin and receiver sheet over the fin. When they exit, hold them in contact for 30 to 60 seconds. This operation must be done under red safelight.

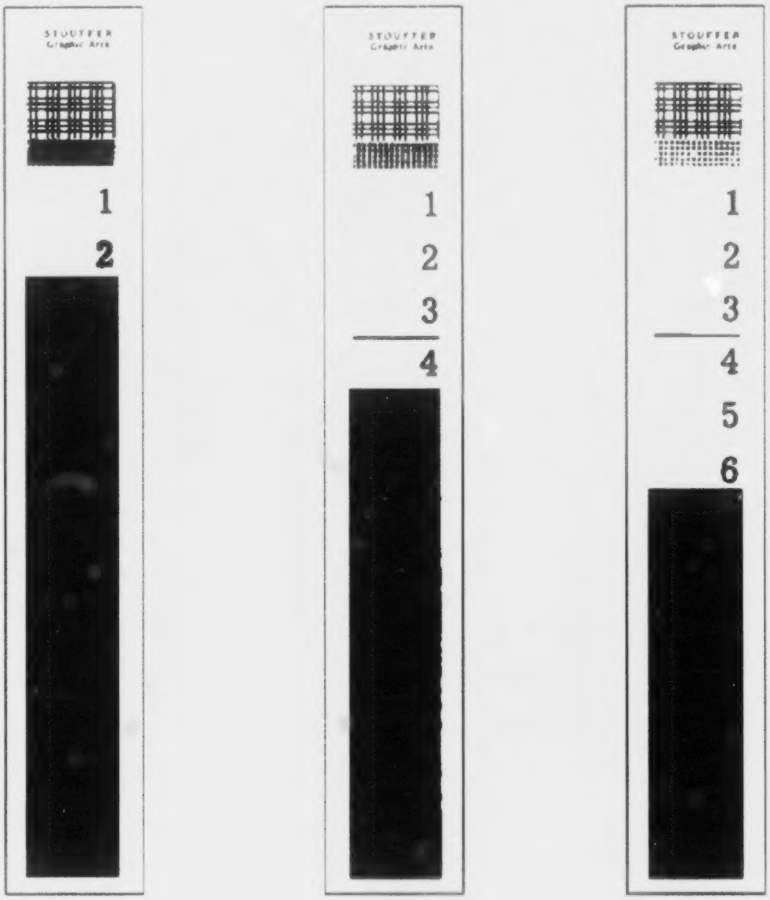
☐ 18. Peel the negative paper away from the receiver paper and discard the negative.

Note: The remaining steps should be done in normal room light.

☐ 19. Examine the gray scale on the receiver paper. Remember, the gray scale step 4 is only a guide. The most accurate copy reproduction occurs when the camera operator compares the original copy with the reproduction.

Note: If the exposure used did not yield a solid step 4 on the gray scale, apply the following concept to make an exposure adjustment to get the desired results: Every 2 steps on the gray scale is either 2X or 1/2 the basic exposure time. Note that gray scale #2 received 1/2 the exposure as gray scale #1. Also note that gray scale #3 received twice the amount of exposure as gray scale #1.

Figure 1



#1 — 5 Seconds

#2 — 10 Seconds

#3 — 20 Seconds

Courtesy Stouffer Graphic Arts Equipment Company

☐ 20. Adjust exposure if necessary.

☐ 21. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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**Objective 5**

## Job Sheet 2—Program a Q15 Exposure Computer and Make a Diffusion Transfer Halftone Print

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Equipment properly set up | ______ |
| • Series of exposures correctly made and processed | ______ |
| • Print examined and computer properly programmed | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Kodak Q15 Exposure Computer
- Kodak 24-Step Reflection Density Guide Q16
- Reflection densitometer (optional)
- Magnifier (10X)
- Diffusion transfer gray contact screen
- Diffusion transfer negative paper
- Diffusion transfer receiver paper
- Diffusion transfer activator
- Diffusion transfer processor
- Process camera
- Black-and-white photograph
- Cardboard
- Masking tape
- Photo chamois or rubber roller

**Procedure**

☐ 1. Set up diffusion transfer processor.

☐ 2. Set up the camera for 1:1 (100%) reproduction

- Set f/stop on f/22.
- Set timer.

Note: Use an exposure of approximately six to eight times the normal line exposure. In this example a 30-second exposure is used.

## Job Sheet 2

☐ 3. Place a Kodak Reflection Density Guide (24 step) on the copyboard.

☐ 4. Place a sheet of 8 x 10 or 10 x 12 inch diffusion transfer negative material on the vacuum back with the emulsion side up.

☐ 5. Cover up approximately one inch of the edge of the diffusion transfer negative material and screen widthwise with a piece of cardboard and tape it down.

☐ 6. Place the diffusion transfer gray contact screen, emulsion side down, over negative material.

Note: To ensure a good contact, the screen should be at least 1 inch larger on all four sides than the diffusion transfer negative.

☐ 7. Wipe the contact screen lightly with a photo chamois or rubber roller to work air bubbles out.

☐ 8. Make an exposure and open the camera back.

Note: Do not turn the vacuum off.

☐ 9. Uncover the covered area and cover the exposed area of the diffusion transfer negative material with contact screen in place.

☐ 10. Make a series of flash exposures.

Note: Use a piece of cardboard to step off a series of at least five 5-second exposures by moving the cardboard $^1/_2$ inch each time.

☐ 11. Remove the contact screen and place it in its original container.

☐ 12. Place the negative on a sheet of receiver paper and process.

☐ 13. Examine the dot structure of the print with a magnifier; identify appropriate size of highlight and shadow dots.

Note: The normal highlight dots should fall on step .00 or higher density of the gray scale. If they do not, another exposure must be made by increasing the exposure. Ask the instructor what the normal highlight dots should be. There will be no dots in the area of the print that represents the darkest steps of the gray scale, but dots do appear in the lower density steps (shadow dots). Select the normal highlight and shadow dot, and note the density of the corresponding steps. In this example we will use hypothetical numbers or .30 for highlight and 1.20 for shadow. The student should use the actual steps that produced the normal highlight and shadow dots. Subtracting highlight density (.30) from shadow density (1.20), we arrive at a Basic Density Range (BDR) of .90. If the original copy has a BDR of .90, a single exposure (main) will reproduce a good halftone print. The BDR will remain the same in any darkroom as long as the same equipment, materials, and techniques are used.

☐ 14. Program the computer to determine the main and flash exposures.

Note: Refer to Job Sheet 1 in Unit 3. Reviewing the outlined procedure will help you set up the Q-15 halftone computer. Depending upon your understanding of the halftone reproduction process you may want to review all of Job Sheet 1.

☐ 15. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ____________________

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**Objective 6**

## Job Sheet 3—Make a Two-Tone Posterization Using Diffusion Transfer Material

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Diffusion transfer processor, camera, and copyboard correctly set up | ______ |
| • Two-tone posterization correctly exposed and processed | ______ |

**Basic Skills**

Reading Employability Technology

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Diffusion transfer processor
- Process camera
- Activator
- Diffusion transfer negative material
- Diffusion transfer receiver material
- Continuous tone photograph

**Procedure**

☐ 1. Set up diffusion transfer processor.

☐ 2. Set up camera for diffusion transfer line copy.

☐ 3. Place a continuous tone copy on copyboard.

Note: Photos that work best for the posterization process typically are fairly high contrast and show the main subject close up to show as much detail as possible. Detail with vertical and horizontal patterns works extremely well.

☐ 4. Place diffusion transfer negative material on the vacuum back with the emulsion side up.

☐ 5. Turn on the vacuum and make a normal line exposure.

☐ 6. Place diffusion transfer negative on a sheet of receiver paper and process.

Note: The resulting print with burned out highlights and solid black shadows is called a two-tone posterization. Posterizing techniques are subjective and can be varied to produce diverse effects.

☐ 7. Clean work area and return equipment and supplies to proper storage.

Evaluator's Comments: ____________________

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**Objective 7**

## Job Sheet 4—Make a Three-Tone Posterization Using Special Effects Screen and Diffusion Transfer Material

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Diffusion transfer processor, camera, and copyboard correctly set up | ______ |
| • Three-tone posterization using special effects screen correctly exposed and processed | ______ |

**Basic Skills**

Reading Employability Technology

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Diffusion transfer processor
- Process camera
- Activator
- Diffusion transfer negative material
- 30% or 40% screen tint
- Diffusion transfer receiver material
- Continuous tone photograph

**Procedure**

☐ 1. Set up diffusion transfer processor.

☐ 2. Set up camera for diffusion transfer line copy.

☐ 3. Place continuous tone copy on copyboard.

☐ 4. Place a sheet of diffusion transfer negative paper on vacuum back with emulsion side up.

☐ 5. Turn on vacuum and make a line exposure equal to two-thirds the normal exposure.

Note: If, for example, 9 seconds is considered a normal exposure, 6 seconds would be used as the line exposure in this case.

☐ 6. Open the vacuum back.

Note: Do not turn the vacuum off.

☐ 7. Place a 30% or 40% screen tint emulsion side down over the exposed diffusion transfer negative material.

☐ 8. Reset the camera timer for approximately 4 times the length of exposure time being used.

☐ 9. Close vacuum back and make the exposure.

☐ 10. Place the diffusion transfer negative on a sheet of receiver paper and process.

Note: This print, in addition to having burned out highlights and a solid shadow, also has a light tint in the middletone area which considerably enhances the detail. Posterization techniques are subjective and may be varied to produce diverse effects. Ask the instructor for other screen patterns to experiment with. Special effects screens that work well with this process include mezzotint, straight line, wavy line, concentric circle, and steel etch.

☐ 11. Clean work area and return equipment and supplies to proper storage.

Evaluator's Comments: ________________________________

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**Objective 8**

## Job Sheet 5—Make a Three-Color Posterization Using Graphic Arts Film

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Darkroom, camera, and copyboard correctly set up | ______ |
| • Films properly exposed and processed | ______ |
| • Three-color posterization made and correctly mounted in register on card stock | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Process camera
- Necessary items for tray processing graphic arts film
- Necessary chemicals for processing film
- Sensitivity guide (gray scale)
- High contrast graphic arts film
- Continuous tone photograph
- White card stock
- Masking tape
- Color key proofing material

**Procedure**

☐ 1. Set up darkroom.

☐ 2. Set up camera for making a line exposure.

☐ 3. Place continuous tone copy with gray scale on the copyboard.

☐ 4. Place a piece of graphic arts film emulsion up on vacuum back and turn on vacuum.

☐ 5. Make a line exposure that will yield approximately a solid 4 on the gray scale.

☐ 6. Process film.

☐ 7. Expose another piece of film to yield a solid 6 on the gray scale and process film.

☐ 8. Expose another piece of film to yield a solid 8 on the gray scale and process film.

Note: Films may be exposed and processed as indicated or they may be exposed, then boxed back up and all may be processed at the end of the exposing cycle.

☐ 9. Make color key proof of three negatives.

Note: The lightest color proof should be used for the negative exposed to a step 4. For example, if these colors are available, yellow would be good to use for the step 4 negative, magenta would be good for the step 6 negative, and cyan would be good for the step 8 negative.

☐ 10. Mount color proof in register on white card stock.

Note: Mount colors on white card stock with the lightest color first. Use masking tape to tape color proof to the card stock.

☐ 11. Clean work area and return equipment and supplies to proper storage.

Evaluator's Comments: ______________________________

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**Objective 9**

## Job Sheet 6—Make a Duplicate Negative and a Film Positive Using Graphic Arts Film

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Darkroom and vacuum printer properly prepared | ______ |
| • Negative and positive correctly exposed and processed | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Contact frame/vacuum printer
- Basic darkroom equipment and chemicals
- Duplicating film (May be either roomlight or darkroom type. Check with your instructor.)
- Negative

**Procedure**

☐ 1. Set up darkroom.

☐ 2. Clean the glass of the vacuum printer.

☐ 3. Place a masking sheet on the rubber mat of the vacuum printer.

☐ 4. Cut a sheet of duplicating film into desired size.

Note: The film should be the same size or larger than the negative.

☐ 5. Place the duplicating film on the masking sheet with the emulsion side up.

☐ 6. Place the negative on top of the duplicating film with emulsion side up.

Note: For faithful reproduction of an original, contacting should be done emulsion to emulsion. In this case the loss of extremely fine details will not be noticeable because of the thin film base. However, for uniformity of the finished product, the original should not be used with the duplicate. It is recommended that more duplicates be made.

☐ 7. Turn on the vacuum.

Note: Pull as high a vacuum as possible, preferably in the range of 25 to 27 inches of mercury on the vacuum indicator.

☐ 8. Make an exposure.

Note: If the platemaker is a flip top, it must be flipped before exposing. If it is not, or if using a contact frame with point-source light, it is ready to be exposed. If the exposure time has not been determined prior to this job sheet, it should be done at this time. To determine the exposure time, step off a series of five-second exposures. Process and dry the negative. Examine the negative and select the step that is the same as the original. The exposure time that was used for this step will be the exposure time for this film.

☐ 9. Process the film.

Note: Process this film following the same procedures used for line or halftone films. Always follow manufacturer's recommendations for the product you are using. CHECK WITH YOUR INSTRUCTOR.

☐ 10. Make a film positive.

Note: There are several methods of making film positives. One method is using a diffusion transfer transparent sheet. Another method is using the line film and the contact printer or bright light duplicating film negative and the platemaker or contact printer. The procedure is the same as when making a duplicate negative. Ask the instructor which film and method should be used, remembering that the line film must be used in the darkroom under red safelight.

☐ 11. Clean work area and return equipment and supplies to proper storage.

Evaluator's Comments: ______________________________

______________________________

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**Objective 10**

## Job Sheet 7—Make a Spread and Choke Using Graphic Arts Film

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Darkroom properly set up and components placed on vacuum printer in register and in correct order | ______ |
| • Films correctly exposed and processed to produce a spread and choke | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Vacuum printer
- Register punch and pins
- Duplicating film (may be either roomlight or darkroom type depending upon your shop conditions)
- Line negative
- Basic darkroom equipment
- Chemicals (developer, stop bath, fixer)
- Diffusion sheet

**Procedure**

☐ 1. Set up darkroom.

☐ 2. Place a masking sheet on the rubber mat of the vacuum printer.

☐ 3. Punch a sheet of duplicating film with register punch.

☐ 4. Punch a sheet of clear plastic with a thickness of approximately .004".

Note: A fixed, washed, and dried sheet of unexposed film may be used.

☐ 5. Punch the line negative.

☐ 6. Place the sheet of punched duplicating film on the vacuum printer with the emulsion side up.

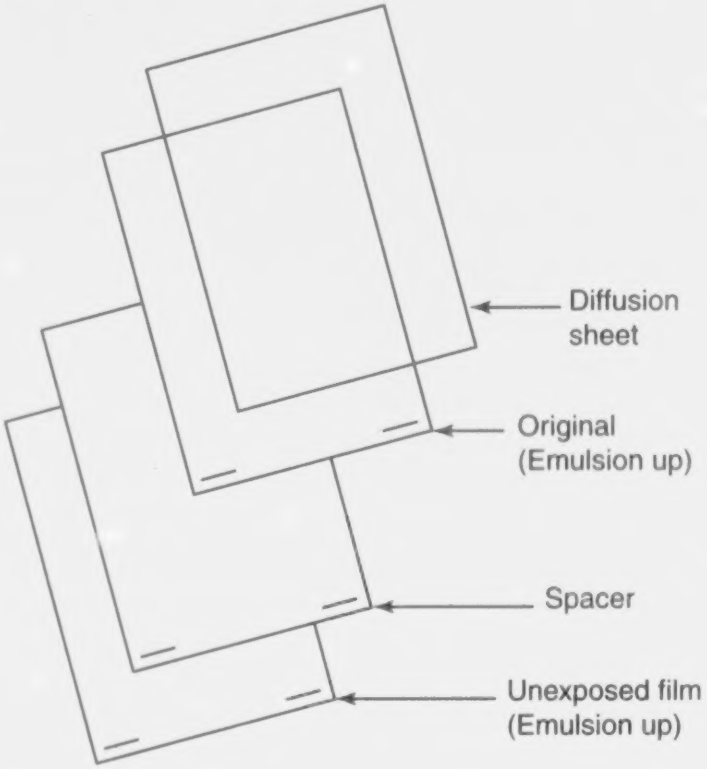
Note: Use register pins.

☐ 7. Register the spacer sheet on top of the film.

Note: The spacer sheet is the sheet of plastic or film base that was punched earlier. Different thicknesses of the spacer sheet will produce different results.

☐ 8. Register the line negative on top of the spacer sheet with the emulsion side up.

Figure 1



☐ 9. Place a diffusion sheet on top of the line negative.

☐ 10. Turn the vacuum on.

☐ 11. Expose and process the film.

Note: Refer to Job Sheet 6 for exposure time.

☐ 12. Process, wash, and dry the negative.

Note: The result is a negative that is somewhat larger, the lines heavier. This is a spread negative. If a positive spread is required, use the same procedures outlined except use negative duplicating film in place of positive duplicating film.

☐ 13. Produce a choke.

Note: Procedures for producing a choke are identical to producing a spread, except a film positive is used in place of a line negative. Refer to Job Sheet 6 for making a film positive.

☐ 14. Clean work area and return equipment and supplies to proper storage.

Evaluator's Comments: ______________________________

______________________________________________

______________________________________________

**Objective 11**

## Job Sheet 8—Make a Combination Print With Reversed Type Overprinted in a Second Color

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Halftone and line negatives correctly made | ______ |
| • Film positive and spread negative correctly made | ______ |
| • Films assembled in register and color key proof correctly made for a combination print with type overprinted | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Process camera
- Contact frame/vacuum printer
- Darkroom equipment and processing chemicals
- Density guide or densitometer
- Contact screen for halftone negatives
- Graphic arts film for making line and halftone negatives
- Contact film (roomlight or darkroom type depending upon shop conditions)
- Duplicating film (roomlight or darkroom type depending upon shop conditions)
- Spacer material (clear polyester or unexposed film, fixed and washed)
- Graphic arts magnifier
- Color key
- Processing chemicals
- White card stock
- Masking tape
- Suitable combination copy

Note: Instructor will provide suitable copy for this activity. Copy should consist of a continuous tone photograph mounted on a base sheet. Registered to the base sheet should be one overlay flap with typographical material: one or two words in 24 to 36 point type is suitable. Registered to the base sheet should be another overlay flap using amberlith or rubylith. To complete this overlay the amberlith/rubylith should be trimmed inside the edge of the photo, the surrounding material should be peeled away, leaving amberlith/rubylith showing over the photo image area. Traditional register marks or a punch register system may be used to register the two overlays to the base art.

## Job Sheet 8

**Procedure**

☐ 1. Use instructor-provided copy to make a halftone negative.

Note: Student may want to review Unit 3 on halftone negative procedures.

☐ 2. Register overlay of type to base art and make a line negative; referred to as *line negative #1*.

☐ 3. Register the other overlay to base art and make line negative of amberlith or rubylith window; referred to as *line negative #2*.

☐ 4. Use line negative #1 in vacuum printer with contact film to make a *film positive #1a*.

Note: Use emulsion up orientation for film contacting procedures.

☐ 5. Again, use line negative #1 in vacuum frame with appropriate spacer material and duplicating film to make a *spread negative #1b*.

☐ 6. With the aid of the instructor, strip film positive #1a to the halftone negative, both film emulsions down; use register marks or punch register to align films.

Note: Film positive should be on top of halftone negative when the two negatives are viewed right reading. Film positive may be taped to halftone to maintain register position.

☐ 7. Register combined assembly of halftone negative and film positive to the window negative identified as line negative #2; once again taping of films is appropriate to maintain register.

☐ 8. Expose and process black color key using film assembly identified in step 7.

☐ 9. Expose and process red or blue color key proof using spread negative #1b.

☐ 10. Using white card stock, register and tape in position the two previously generated pieces of color key material.

Note: If the instructor has not already explained, ask why it is necessary to spread an image that overprints an area that has been reversed out.

☐ 11. Clean work area and return equipment and supplies to proper storage.

Evaluator's Comments: ______________________________

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# Unit 5 Overview of Process Color Photography

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## Objective Sheet

**Unit Objective**

After completing this unit, the student should be able to make a set of uncorrected direct screen four-color separation negatives and use acetate overlay proofing material to make a full-color proof. The student should demonstrate these competencies by completing the job sheets and by scoring a minimum of 85 percent on the written test.

**Specific Objectives**

After completing this unit, the student should be able to:

1. Match terms related to process color photography with their definitions.
2. Distinguish between additive and subtractive primary colors.
3. Select true statements concerning the functions of printing inks.
4. Select true statements concerning color separation.
5. Name methods for making color corrections.
6. Make a set of unmasked direct screen four-color separation negatives. (Job Sheet 1)
7. Make an acetate overlay proof. (Job Sheet 2)

## Information Sheet

Objective 1

### Terms and definitions

a. **Acetate proofing system**—A system used to proof separation negatives

Note: The colorant used on the acetate overlay sheet is selected so that when the four process colors are mounted in register, the proof will produce a close visual simulation of the printed job.

b. **Code notch**—One or more notches on one corner of a sheet of film used to identify the emulsion and emulsion side of the film

Note: Notches are primarily used on panchromatic film and transparent materials.

c. **Color correction**—The process of compensating for ink deficiencies in making separation negatives

d. **Color separation**—A process of separating the color original into three black-and-white negatives

e. **Complementary color**—The color that is opposite another color on a color wheel

f. **Cyan**—A blue-green color that is used in color separation and color printing

g. **Magenta**—A dark pink color that is used in color separation and color printing

h. **Mask**—A black-and-white photographic image of a color original used for color correction

i. **Moire**—An undesirable pattern on a halftone negative created by the improper angling of the contact screen

j. **Neutral density filter (ND)**—A grey-colored filter used to add density with no change in color

k. **Panchromatic film**—Film that is sensitive to all colors of light

l. **Primary colors**—Colors which cannot be produced by mixing other colors

m. **Scanner**—Device that converts an image such as line art or photos to digital data usable by the computer

n. **Separation negative**—The negative that represents one of the primary colors from a color original

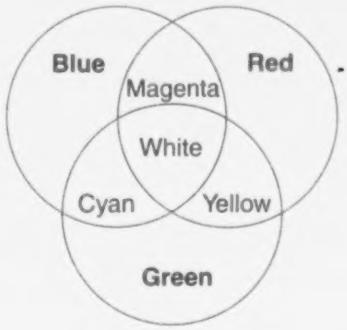
**Objective 2**

## Primary colors

a. Additive primary colors

- The additive primary colors are blue, green, and red.
- When the three additive primary colors are added together, they will form white light.

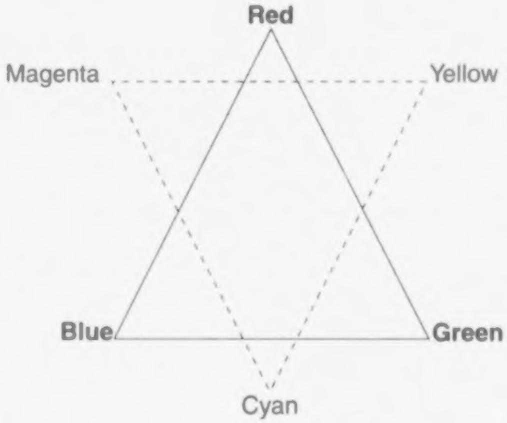
Figure 1


Blue
Red
Magenta
White
Cyan
Yellow
Green

- When one color is subtracted, the remaining two will form another color which is complementary to the subtracted color.

Note: If the blue light is subtracted, the red and green will form yellow, which is complementary to blue.

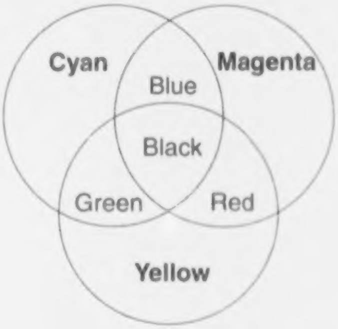
Figure 2


Red
Magenta
Yellow
Blue
Green
Cyan

b. Subtractive primary colors

- The subtractive primary colors are cyan, magenta, and yellow.
- Cyan, magenta, and yellow are the complementary colors of additive primary colors.
- When the cyan, magenta, and yellow inks are mixed together in various proportions, they produce a full range of colors.
- Cyan, magenta, and yellow are also called process colors.
- When solid layers of the process colors are printed on a white sheet, they produce black.

Figure 3



**Objective 3**

**Functions of printing inks**

a. Inks absorb light.

b. Inks are used to control the light that is permitted to strike the paper and to be reflected from it.

c. Each of the three primary colored printing inks absorbs one of the three component colors of white light and leaves the other two components to be reflected.

- Cyan ink absorbs the red part of white light.

  Note: Where cyan ink is printed, only green and blue light can be reflected from it. This combination of green and blue light appears cyan in color.

- Magenta ink absorbs the green part of white light.

  Note: Where magenta ink is printed, only red and blue light can be reflected from it. This combination of red and blue light appears magenta in color.

- Yellow ink absorbs the blue part of white light.

  Note: Where yellow ink is printed, only red and green light can be reflected from it. This combination of red and green light appears yellow in color.

- Black ink absorbs all components of white light.

  Note: Its only function in four-color printing is to increase the contrast of the reproduction.

Objective 4

**Color separation**

a. Three plates are used for printing the three colored inks.

   Note: Four plates will be necessary if a black printer is also used.

b. Each plate records either the cyan, magenta, or yellow ink.

c. Three separate negatives are needed, each one representing one of the primary colors.

   Note: To avoid moire, each separation negative is made at a different screen angle, i.e., cyan printer at 105°, yellow printer at 90°, magenta printer at 75°, and black at 45°.

d. Negatives are made by photographing the color original three times through three different filters on black-and-white panchromatic film.

e. The cyan printer separation negative is made by exposing through a red filter.

f. The magenta printer separation negative is made by exposing through a green filter.

g. The yellow printer separation negative is made by exposing through a blue filter.

Objective 5

**Methods for making color corrections**

Note: Printing three color images (cyan, magenta, and yellow) with one on top of the other in perfect register will not reproduce a faithful image of the original. The problem is not in faulty craftsmanship, filters, or the process, but rather in the inks. Process inks are not pure absorbers. Each of the inks absorbs some of the other two colors in addition to its complementary color. The result is a low contrast and muddy reproduction. The correction is achieved by printing less of the inks of certain colors in specific areas. There are three popular methods of color correcting which are described below.

a. Photographic masking

   - Photographic mask—A weak image of the color original on photographic film

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- Mask—Used with either the color copy or the negative when making separation negatives

  Note: Photographic masking is the most popular method of color correcting. There are several methods of masking: positive masking, negative masking, camera back masking, using an enlarger, using a contact frame, single stage masking, two stage masking, etc. Although a very important part of the process photography, masking procedures will not be discussed in this unit due to the time-consuming nature of the process in a typical school shop. However, a job sheet on unmasked direct screen color separation is included. Unmasked separations are extensively used in newspaper reproduction. Masking is strongly recommended if time permits.

b. Electronic scanning

Note: Electronic scanning is becoming very commonplace in magazine and trade journal publications—a direct result of computer-to-plate technology. Even in production departments using color separations, computer scanning is an important quality control tool.

c. Localized dot etching

## Student Supplement 1—Direct Screen Separation Record

Subject Matter ______________________ Date ______________________

Contact Screen: Type ______________________

Ruling ______________________

| Printer | Filter | Main Exposure | Flash Exposure |
|---|---|---|---|
| Cyan | PM23A/25 | | |
| Magenta | PM58 | | |
| Yellow | PM47B/47 | | |
| Black | PMK2 | | |

Suggested AIM points for negative dot percentages on halftone separation negatives

| | A (Highlight) | M (Middletone) | B (Shadow) |
|---|---|---|---|
| Cyan | 95<br>± 2% | 50<br>± 3% | 10<br>± 4% |
| Magenta | 97<br>± 2% | 63<br>± 3% | 20<br>± 4% |
| Yellow | 97<br>± 2% | 63<br>± 3% | 20<br>± 4% |
| Black | Solid | Solid | 55%<br>± 5% |

**Objective 6**

## Job Sheet 1—Make a Set of Unmasked Direct Screen Four-Color Separation Negatives

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| **Evaluation Criteria** | **Rating** |
|---|---|
| • Appropriate filter and screen angle used with each negative | ______ |
| • Separation negatives made with correct dot percentages in A, M, and B patches as specified | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Introduction**

This exercise is representative of four-color process photography work found in day-to-day newspaper operation. Although higher quality printing jobs require color correction in some form, masking being the most popular, this exercise covers only the basic procedures of producing four-color negatives.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Process camera
- Standard darkroom equipment
  Note: See Unit 3, "Halftone Photography" for the list of equipment.
- Flash lamp with 7 1/2 watt frosted bulb and ND No. 96 (1.30 density) filter
- Preangled chipboard
  Note: This chipboard was made in Unit 3, "Halftone Photography."
- Kodak Color Separation Guide with A, M, B Patch, Q13
- Color illustration (photograph)
  Note: Instant color prints are not suitable for this process.
- Filter holder
- Filters (PM23A, PM58, PM47B, K2)
  Note: These filters may be substituted with the following: No. 25 for PM23A and PM47 for PM47B.
- Black masking tape
- Transparent tape
- Gray contact screen
- Panchromatic film
- Magnifying glass
- Kodak Direct Screen Calculator Q-10B
- Student Supplement 1

## Job Sheet 1

**Procedure**

☐ 1. Set up the process camera.

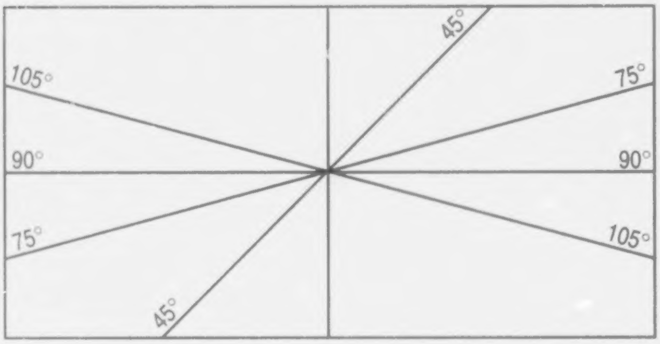
☐ 2. Set up the darkroom and stabilize the temperature.

☐ 3. Set up flash lamp for making flash exposure.

Note: A conventional flash lamp filter is not suitable for the separation process. A neutral density filter No. 96 (1.30 density) over a 7 1/2 watt frosted tungsten bulb 7 feet from the camera back is recommended.

☐ 4. Place the preangled chipboard on the copyboard and fasten it down (Figure 1).

Figure 1



☐ 5. Place a Kodak Color Separation Guide (A, M, B Patch) next to the original color illustration. Add registration marks as indicated.

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☐ 6. Fasten these two pieces on a mounting board that is approximately the same size as the two pieces.

☐ 7. Draw two short lines on the center of the mounting board, one on the top and one on the bottom.

☐ 8. Place the copy on the center of the preangled chipboard and line up the short lines of the copy with the 105° line.

☐ 9. Set up the camera for the first trial exposure by placing a PM 23A or a number 25 (red) filter in the filter holder of the camera.

☐ 10. Set the lens at f/16 and timer at 25 seconds.

☐ 11. Set the flash exposure at 20 seconds.

Note: Due to extreme differences in cameras, lighting systems, and films, the main and flash exposures are listed as trial exposures. The actual determination of the acceptability of a particular separation negative must be evaluated by checking the A, M, and B patch dot size. The A patch dot may be adjusted for proper size by using the trial exposure in conjunction with the Q-10B exposure calculator. The shadow dot (B patch) may be adjusted in dot size by using the traditional flash step-off test to determine a basic flash and adjusting the flash exposure to correspond for the density of step B. In some instances it is not unusual for the M patch dot size to fall outside recommended tolerance when using the main/flash exposure system. Once the correct main/flash exposures have been determined, they may be recorded on Student Supplement 1. A permanent record of this information will be helpful if subsequent separations are to be made.

☐ 12. Set the darkroom timer to 2 minutes and 45 seconds (2:45).

Note: A timer with a buzzer is recommended to signal the end of the developing time.

☐ 13. Place reference marks on the camera back.

Note: Place two pieces of black masking tape at right angles to each other on the camera back to aid in the positioning of the film in total darkness. Since the copy is angled on the copyboard, a much larger sheet of film must be used to cover the entire copy. A 10″ x 12″ sheet of film is recommended for a 4″ x 5″ copy.

☐ 14. Turn all lights off.

Note: Before doing so, remember where everything is (for example, the film, screen, developer, and fixer).

☐ 15. Place a sheet of panchromatic film on the camera back with the emulsion side up.

Note: The emulsion side is up when the code notice is in the top right hand corner of the film.

☐ 16. Place the contact screen on the top of the film with the emulsion side down.

Note: Make sure the screen is parallel with the camera back and is placed at the same position for all four separation negatives. To ensure this, the contact screen may be fastened to the camera back with black masking tape.

☐ 17. Rub the screen with the back of your hand or a rubber roller to ensure a good contact.

☐ 18. Expose for main and flash.

☐ 19. Develop, fix, and wash the film.

Note: Refer to Unit 3, "Halftone Photography" for the proper methods of film processing.

☐ 20. Examine the negative on a light table with a magnifying glass.

Note: Check the dot sizes in A, M, and B Patch. The aim points for this negative (cyan printer) are: A-step–95% ± 2%, M-step–50% ± 3%, and B-step–10% ± 4%. If these percentages are not present, remake the negative. Use a Q-10B Exposure Computer and alter the exposure until the desired dot structure is achieved. Keep a record of the exposures of all four separation negatives; it will help reduce the remaking of future separation negatives.

☐ 21. Turn the copy on the copyboard and line up the short lines of the copy with the 75° line.

☐ 22. Place a PM58 (green) filter in the filter holder of the camera.

☐ 23. Set the lens at f/16 and timer at 70 seconds.

☐ 24. Set the flash exposure at 20 seconds.

☐ 25. Repeat procedure steps 12 through 20.

Note: The aim points for this negative (magenta printer) are: A-step–97% ± 2%, M-step–63% ± 3%, and B-step–20% ± 4%. Remake if necessary.

☐ 26. Turn the copy on the copyboard and line up the short lines of the copy with the 90° line.

☐ 27. Place a PM47B (blue) filter in the filter holder of the camera.

☐ 28. Set the lens at f/11 and timer at 130 seconds.

☐ 29. Set the flash exposure at 20 seconds.

☐ 30. Repeat procedure steps 12 through 20.

Note: The aim points for this negative (yellow printer) are the same as magenta printer: A-step–97% ± 2%, M-step–63% ± 3%, and B-step–20% ± 4%. Remake if necessary.

☐ 31. Turn the copy on the copyboard and line up the short lines of the copy with the 45° line.

☐ 32. Place a K2 filter (yellow) in the filter holder of the camera.

☐ 33. Set the lens at *f*/16 and timer at 20 seconds.

☐ 34. Repeat procedure steps 12 through 20.

Note: DO NOT FLASH THIS NEGATIVE. The aim points for this negative (black printer) are: A-step–no dots, M-step–no dots, and B-step–55° ± 5%. Remake if necessary.

☐ 35. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________

______________________________

**Objective 7**

## Job Sheet 2—Make an Acetate Overlay Proof

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Proofing material properly exposed and developed | ______ |
| • Overlay proof mounted in register and in proper sequence on white cover stock | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Introduction**

Acetate overlay proofs are useful to approximate the final appearance of a four-color printing job. This exercise gives the student experience in producing this valuable tool.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Vacuum printer/platemaker
- Table or sink for processing acetate sheets
- Transparent gray scale (used for correct exposure determination)
- Acetate overlay proofing material (Imation Color-Key or comparable product)
- Required processing solution
- Newsprint or other absorbent paper
- Squeegee
- Cotton pads
- Transparent tape
- White cover stock for mounting acetate proof

**Procedure**

☐ 1. Set up vacuum printer to make test exposure.

☐ 2. Make step-off exposure using transparent gray scale.

Note: Check with instructor for exposure times and procedure to be used for step-off test.

☐ 3. Process test exposure material according to manufacturer's recommendation.

☐ 4. Evaluate test results and determine exposure to be used.

☐ 5. Proof all four separation negatives on their respective color proofing materials.

☐ 6. Mount yellow proof on white cover stock with transparent tape.

☐ 7. Place the magenta printer on top of the yellow; with the aid of the magnifying glass and register marks on the two proofs, bring the two images into register.

☐ 8. Tape the magenta printer along the top edge.

☐ 9. Register the cyan printer with the other two and tape it down on the top edge.

☐ 10. Register the black printer with the previous three and tape down along the top edge.

☐ 11. Turn in the registered proof and separation negatives to the instructor.

☐ 12. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ____________________

____________________

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## Objective Sheet

**Unit Objective**

After completing this unit, the student should be able to strip negatives using a variety of flat systems commonly used in the graphic arts industry. The student should demonstrate these competencies by completing the job sheets and by scoring a minimum of 85 percent on the written test.

**Specific Objectives**

After completing this unit, the student should be able to:

1. Match terms related to stripping procedures with their definitions.
2. Match stripping tools and materials with their proper uses.
3. Identify the parts on a layout of a typical flat.
4. Select true statements concerning the emulsion side and the base side of a negative.
5. Select true statements concerning the methods of combining line and halftone work.
6. Name two types of combination printing.
7. Identify stripping register marks and pins.
8. Establish true edge and vertical alignment on a stripping table (square up). (Job Sheet 1)
9. Strip a ruled flat (right-reading). (Job Sheet 2)
10. Lay out and strip an unruled flat (wrong-reading). (Job Sheet 3)
11. Strip a flat for single color envelopes. (Job Sheet 4)
12. Strip a flat for single color work and turn imposition. (Job Sheet 5)
13. Strip a flat for single color work and tumble imposition. (Job Sheet 6)
14. Strip for step-and-repeat. (Job Sheet 7)
15. Strip a single color flat for a 4-page signature. (Job Sheet 8)
16. Lay out signature flats and strip a single color flat for an 8-page signature. (Job Sheet 9)
17. Strip a single color step-and-repeat using pin register. (Job Sheet 10)
18. Combine line and halftone work. (Job Sheet 11)
19. Strip for combination print (double burn with screen tint). (Job Sheet 12)

## Objective Sheet

20. Strip complementary flats for multi-color printing. (Job Sheet 13)

21. Lay out signature flats for a 16-page signature. (Job Sheet 14)

22. Strip a two-color job using pin register and masking film. (Job Sheet 15)

23. Determine daylight copy proofing exposure using a step-off test. (Job Sheet 16)

24. Expose a blueline or daylight copy proof. (Job Sheet 17)

## Information Sheet

Objective 1

### Terms and definitions

a. **Combination printing**—Printing line copy on top of a halftone

Note: Combination printing is also called surprinting or overprinting.

b. **Complementary flat**—A flat containing negatives for only one color or part of a multi-color job

c. **Double burn**—Exposing a plate twice using two complementary flats

d. **Emulsion side**—The side of the film coated with light-sensitive material

e. **Flat**—Negative or negatives attached to masking sheet from which the offset plate is made

f. **Goldenrod**—Another name for masking paper; yellow or orange in color

g. **Imposition guide**—A sheet marked to show the page positions

Note: This is commonly referred to as a dummy.

h. **Lithographer's tape**—Red tape; opaque in nature

i. **Main flat**—Flat containing the key negatives of a multi-color job

j. **Masking sheet**—Special opaque paper or plastic sheet used to make the flat

Note: Masking sheets can be either ruled or unruled.

k. **Opaque**—To prevent light from passing through a material

l. **Pinholes**—Small clear areas in the negative which would allow light to pass through if not detected and opaqued

m. **Pin register**—Accurate system of registration using punched negatives, flats, plates, and positioned register pins

n. **Register**—To print the image in the exact same position on each sheet of paper

o. **Register marks**—Small crosses, guides, or patterns placed on originals and flats to aid registration

p. **Rule**—A line scribed or scratched on a negative

q. **Signatures**—Usually two, four, eight, or sixteen pages printed on a single sheet to be folded and trimmed as a book or part of a book

r. **Step-and-repeat**—The process of repeating the exposure of a flat several times on an offset plate

Note: The step-and-repeat method of stripping is used for press-run economy by burning a single image on the plate several times to produce many images on each press sheet.

s. **Stripping**—The process of fastening negatives to masking sheets to produce a flat

t. **Windows**—Openings in the masking sheet that expose image areas onto the offset plate

Objective 2

## Uses of stripping tools and materials

a. Stripping knife—A single-edged, pointed razor blade, affixed to a handle; used to cut masking sheets and windows

b. Opaque brush or pen—A fine-pointed artist tool used to apply opaquing solution to a negative

c. T-square—Instrument, usually stainless steel or plastic, used to square work on a light table

d. Straight-edge ruler—Instrument, usually stainless steel or plastic, used to measure, rule, and cut along an edge

e. Tape dispenser—Holds rolls of tape and contains attached cutting edge

f. Triangles—Metal or plastic 45-45-90 or 30-60-90 degree triangles used to rule and cut along specific lines

g. Scribing tool—A shaped, sometimes looped point with handle for scratching lines on negative

h. Light table—A table with a frosted glass top and a light underneath to view flats and negatives

i. Magnifier (linen tester)—Magnifying glass mounted on a small frame; used to detect negative flaws

j. Register pins and punches—Used to secure flats and plates for close registration

k. Scissors—Cutting instrument used in trimming

l. Line-up-table—Light table with built-in vertical and horizontal straight edges, calibrated for accuracy

m. Goldenrod (masking sheets)—Used to prevent light from reaching the plate

n. Masking tape—Used to tape masking sheets to the light table

o. Lithographer's tape—Used to fasten negatives to the masking sheet and cover large pinholes

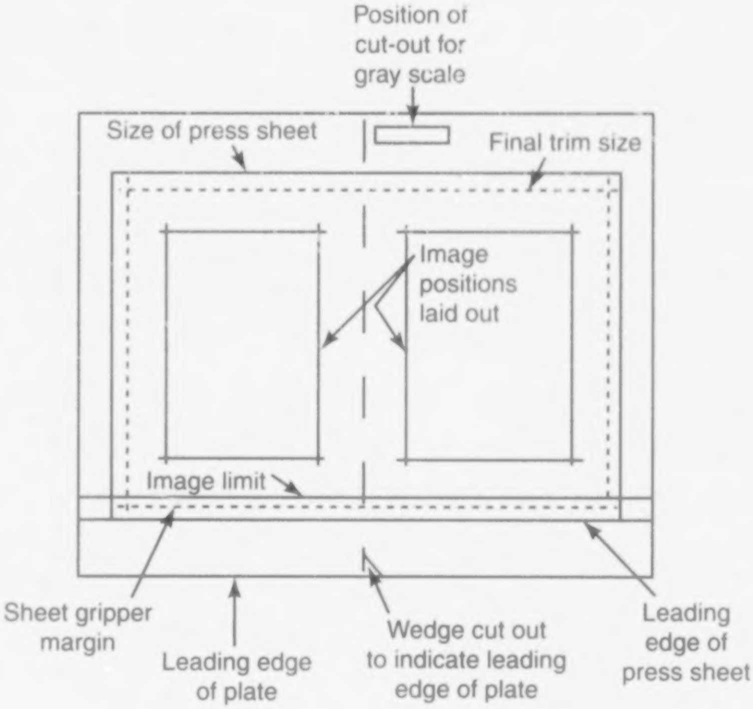
p. Opaque solution—Used to cover pinholes and scratches

q. Amberlith or rubylith—Peelable film used for stripping multi-color work

**Objective 3**

**Parts on a layout of a typical flat**

Figure 1


Position of cut-out for gray scale
Size of press sheet
Final trim size
Image positions laid out
Image limit
Sheet gripper margin
Leading edge of plate
Wedge cut out to indicate leading edge of plate
Leading edge of press sheet

**Objective 4**

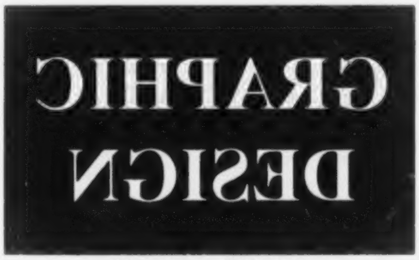
**The emulsion side and base side of a negative**

a. Emulsion side

- Coated side which carries the image
- If scratched, the emulsion comes off leaving only the clear base, thus allowing light to pass through the negative.

- Backward or wrong-reading

Figure 2

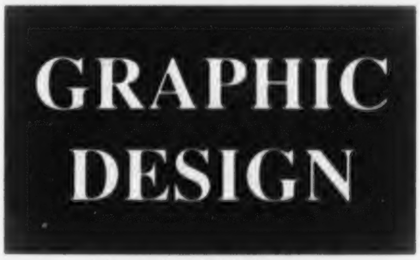


Emulsion Side Up

b. Base side

- Made of a polyester or acetate (plastic base)
- Coated with a dye which absorbs light and prevents reflection (antihalation coating)
- Right-reading

Figure 3



Emulsion Side Down

**Objective 5**

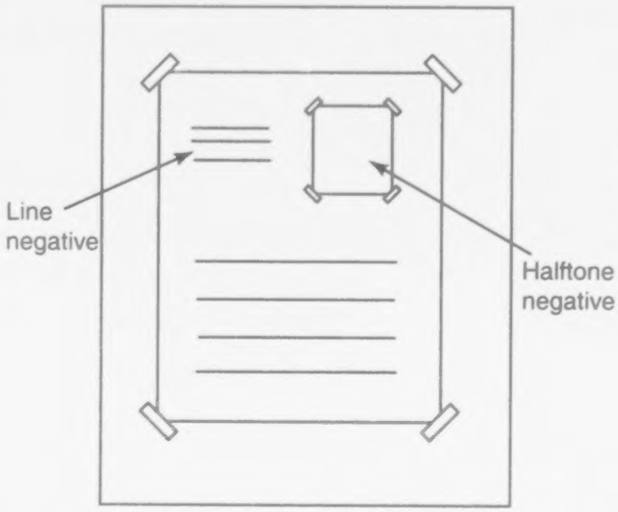
**Methods of combining line and halftone work**

a. Halftone window is cut from red or black material such as paper or masking film, and window is positioned on paste-up.

- Line negative is developed so halftone window remains clear.

- Halftone negative is stripped into the clear window.

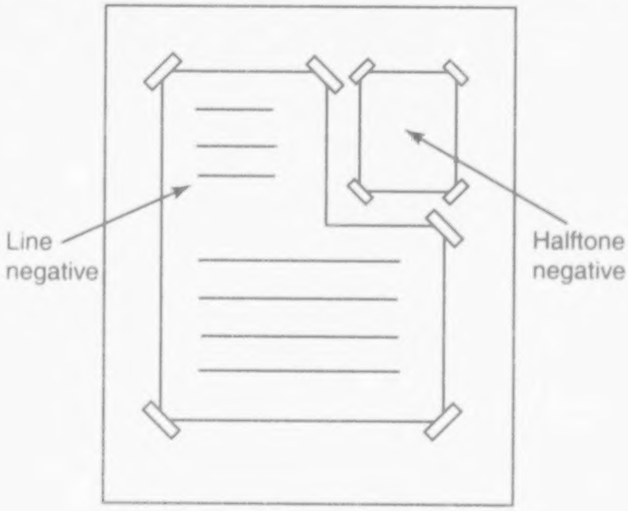
Figure 4


Line negative
Halftone negative

b. Line and halftone negatives are stripped separately to the same flat.

- Negatives are trimmed and taped into position on the flat.
- Windows are cut for halftone and line copy in the flat.

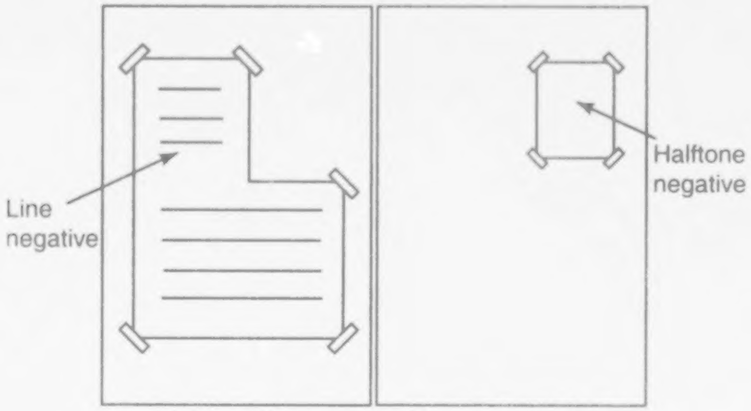
Figure 5


Line negative
Halftone negative

c. Negatives are stripped and exposed on separate flats.

- Line negative is positioned carefully on flat and plate burned.
- Halftone negative is positioned carefully on second flat and second burn is made on plate.

Figure 6



**Objective 6** **Types of combination printing (surprinting or overprinting)**

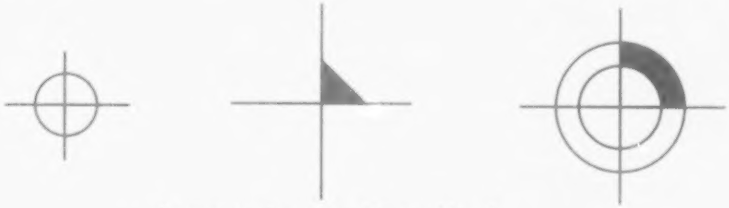
a. Positive lettering printed on top of halftones

b. Reversed lettering printed on top of halftones (single burn)

**Objective 7** **Stripping register marks and pins**

a. Alignment marks

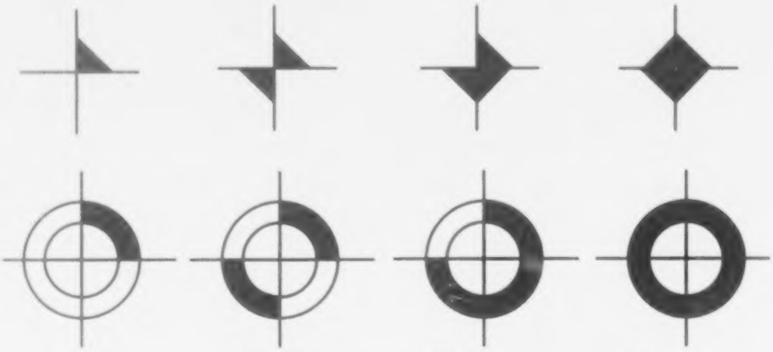
Figure 7



Common Register Marks Used for Alignment or Single Runs

b. Multiple printing marks

Figure 8

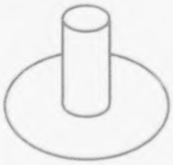


1st Run 2nd Run 3rd Run 4th Run

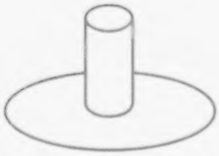
Register Marks for Multiple Printings

c. Register pins

Figure 9



Round Register Pin



Elongated (or Oval)
Register Pin

**Objective 8**

## Job Sheet 1—Establish True Edge and Vertical Alignment on a Stripping Table (Square Up)

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Alignment guide properly drawn | ______ |
| • Alignment (squared-up) achieved | ______ |

**Basic Skills**

Reading Mathematics Technology

**Introduction**

This exercise will familiarize the student with the fundamentals of layout stripping procedures and provide an introduction to the use of stripping tools, equipment, and materials.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Line gauge or center ruler
- Black ballpoint pen (medium point)
- Sheet of 11" x 17" bond
- Tape dispenser with masking tape and lithographer's tape
- Screwdriver

  Note: Most light tables require a flat edge screwdriver, however check your light table before getting the screwdriver from the tool storage area.

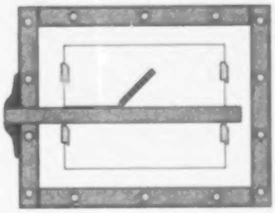
**Procedure**

☐ 1. Obtain sheet of 11" x 17" bond and square it up on the surface of the light table using your T-square.

☐ 2. Hold it securely and tape it into position with two pieces of tape on both the right and left hand sides.

☐ 3. Place your T-square against the left hand side of the table. Using the ballpoint pen, draw a horizontal centerline across the center of the sheet (Figure 1).

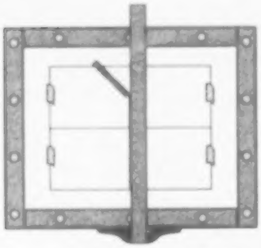
Figure 1



Courtesy of Graphic Arts Technical Foundation.

☐ 4. Place your T-square against the bottom side of the table. Using the ballpoint pen, draw a vertical line that bisects the horizontal centerline in the center of the sheet (Figure 2).

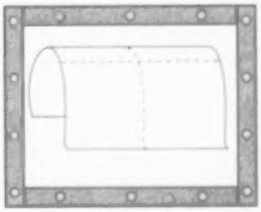
Figure 2



Courtesy of Graphic Arts Technical Foundation.

☐ 5. Flop the sheet back-to-front (Figure 3).

Figure 3



Courtesy of Graphic Arts Technical Foundation.

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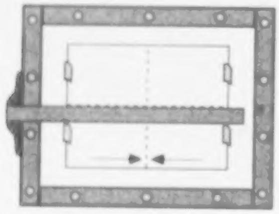
☐ 6. Place the T-square against the left hand side of the table and align the paper using the horizontal centerline and attach it to the light table surface with tape (Figure 4).

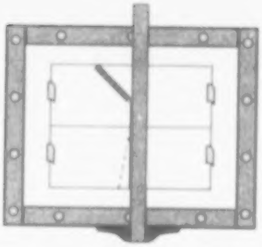
Figure 4



Courtesy of Graphic Arts Technical Foundation.

☐ 7. Place the T-square against the bottom side of the table and draw a vertical line through the original point of intersection (Figure 5).

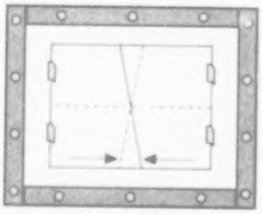
Figure 5



Courtesy of Graphic Arts Technical Foundation.

☐ 8. Measure the distance between the ends of the two vertical lines at the top and bottom of the sheet (Figure 6).

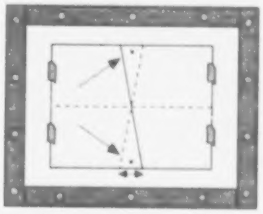
Figure 6



Courtesy of Graphic Arts Technical Foundation.

☐ 9. Mark the halfway points between the vertical lines (Figure 7).

Figure 7

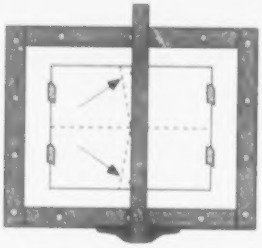


Courtesy of Graphic Arts Technical Foundation.

☐ 10. Loosen the screws on the front of the light table.

☐ 11. Adjust the front edge of the stripping table so that the T-square's blade connects the two halfway points (Figure 8).

Figure 8



Courtesy of Graphic Arts Technical Foundation.

☐ 12. Tighten the screws.

☐ 13. Have your instructor evaluate your squared-up light table.

☐ 14. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ____________________

____________________

____________________

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**Objective 9**

## Job Sheet 2—Strip a Ruled Flat (Right-Reading)

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Negative properly positioned and taped to masking sheet | ______ |
| • Window opened up no closer than 1/4″ to image area | ______ |
| • Imperfections in negative properly opaqued out | ______ |

**Basic Skills**

Reading

Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Tape dispenser with masking tape and lithographer's tape
- T-square
- 12″ ruler
- Stripping knife
- Opaque brush and opaque solution
- Light table
- 13″ x 19$^{3}/_{8}$″ ruled masking sheet
- 11″ x 17″ line negative

**Procedure**

☐ 1. Position masking sheet with gripper margin toward top of light table.

☐ 2. Turn on light table.

☐ 3. Position line negative under masking sheet and line up center marks on negative with centerlines found within the page size identified on masking sheet.

☐ 4. Move negative into exact square position by using the vertical and horizontal lines printed on the masking sheet,

☐ 5. Hold negative in aligned position with left hand and secure lower right corner to masking sheet with lithographer's tape.

☐ 6. Hold negative and masking sheet in aligned position with right hand and secure lower left corner of negative to masking sheet with lithographer's tape.

☐ 7. Leave top edge of masking sheet taped to light table, and flip flat over to tape remaining two corners of negative.

☐ 8. Flip flat back over and use stripping knife to open image area by cutting masking sheet (Figure 1).

Note: Do not cut closer than 1/4" to the image.

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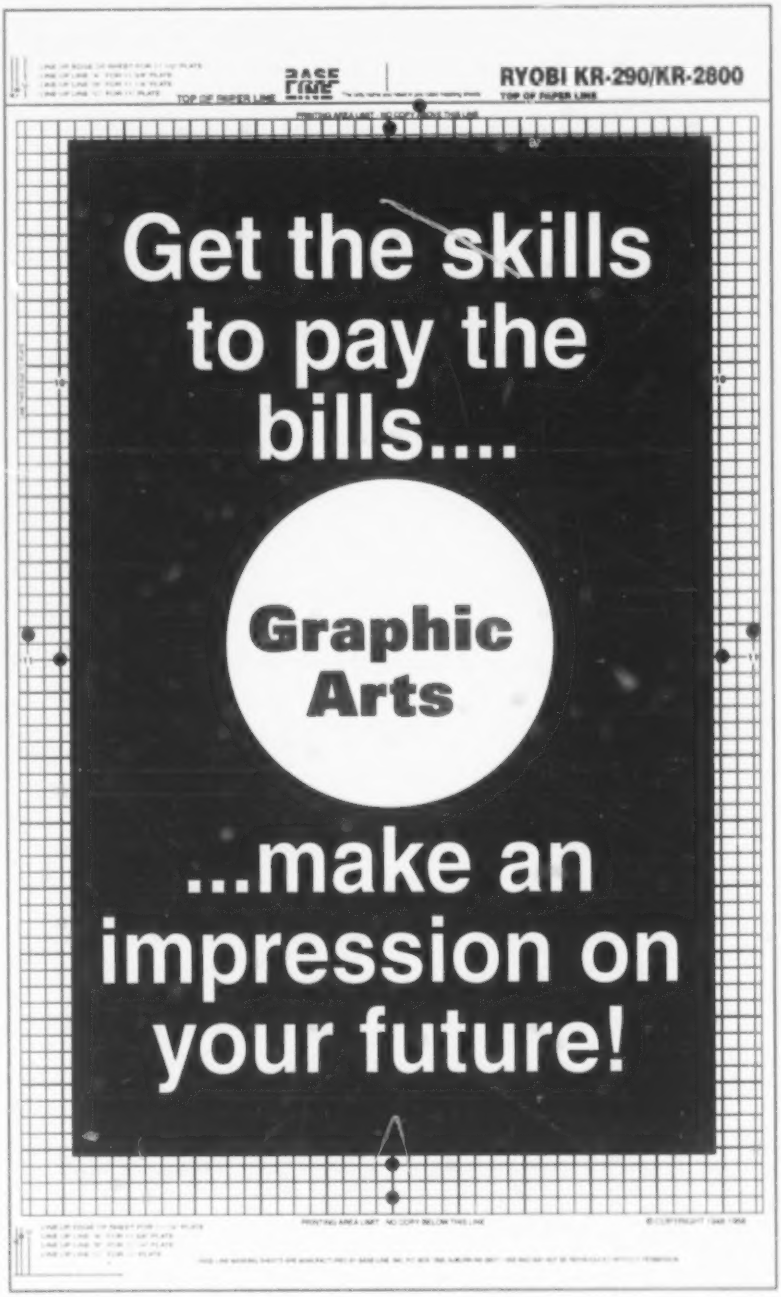
Figure 1


BASE LINE
RYOBI KR-290/KR-2800
TOP OF PAPER LINE
TOP OF PAPER LINE
PRINTING AREA LIMIT NO COPY ABOVE THIS LINE
Get the skills to pay the bills....
Graphic Arts
...make an impression on your future!
PRINTING AREA LIMIT NO COPY BELOW THIS LINE

Base-Line masking sheet used with permission of Base-Line, Inc.

Note: Figure 1 shows negative stripped to a ruled masking sheet. In this stripping procedure, the negative is positioned underneath the masking sheet emulsion down with the image right reading. Although center marks on the negative are not visible, the same type of image alignment may be used as in Job Sheet 3. The outer four dots represent the page size, the inner four dots represent the vertical and horizontal centerlines of the indicated page size. As the negative is slid underneath the masking sheet, the center marks on the edges of the negative are lined up with the centerlines on the masking sheet.

☐ 9. Use opaque brush and opaque solution to cover any pinholes or scratches in exposed negative area.

☐ 10. Give completed flat to instructor for evaluation.

☐ 11. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________

______________________________

**Objective 10**

## Job Sheet 3—Lay Out and Strip an Unruled Flat (Wrong-Reading)

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Masking sheet properly laid out with plate bend line, gripper line, and centerlines | _____ |
| • Negative properly located on masking sheet with correct emulsion orientation and taped with litho tape | _____ |
| • Window properly opened up over image area, no closer than 1/4" to image area | _____ |
| • Imperfections in negative properly opaqued out | _____ |

**Basic Skills**

Reading Mathematics Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Unruled masking sheet (goldenrod stock)
- Tape dispenser with masking tape and red lithographer's tape
- Black fine or medium point ballpoint pen
- T-square
- Triangle
- Printer's line gauge or centering rule
- Stripping knife or single-edge razor blade
- Opaque solution and opaque brush or opaquing pen
- Line negative appropriate for 8 1/2" x 11" job size
  Note: Instructor may provide you with a negative or may require you to make your own.
- Light table

**Procedure**

Note: Although there are many stripping systems currently used in the graphics industry, the centerline stripping method will be used throughout this unit. Two vertical and two horizontal center marks in black ink are placed on the outer edge of the vertical and horizontal center of the copy. When a line negative is made, these four marks show up as tiny clear areas which may be used to position the negative with the vertical and horizontal lines drawn within the page size on the masking sheet.

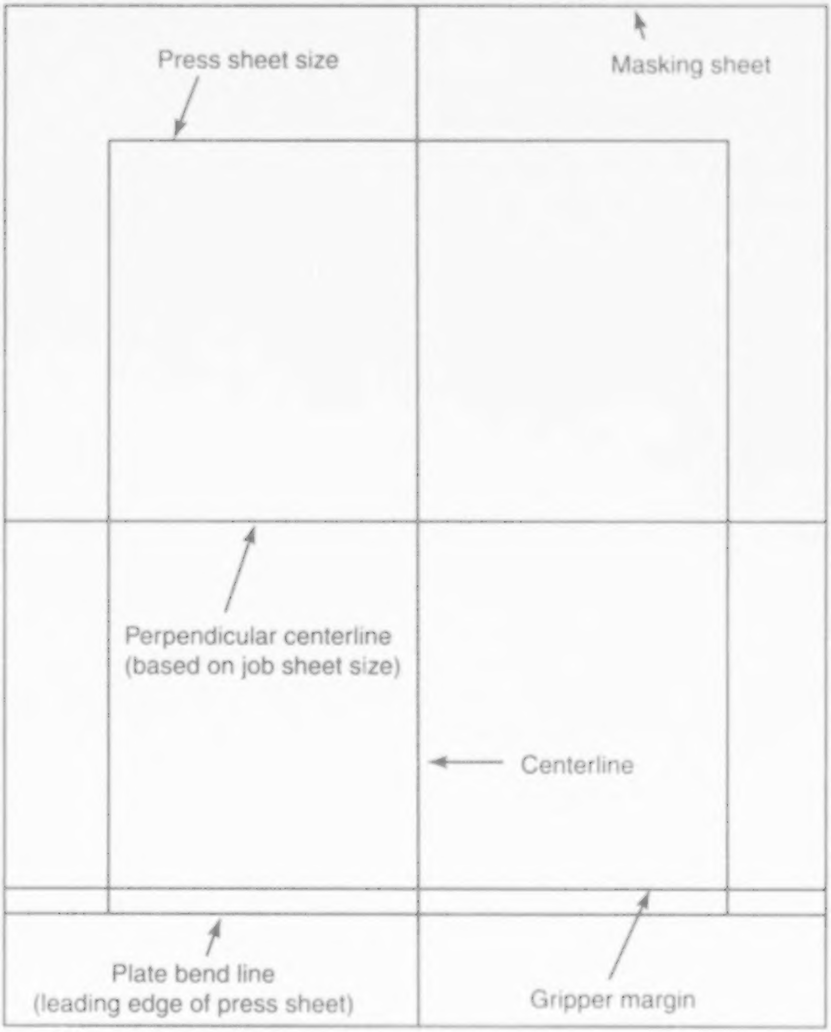
## Job Sheet 3

☐ 1. Obtain the correct masking sheet size.

☐ 2. Position the masking sheet on the light table; check with instructor for orientation of gripper edge.

☐ 3. Using the T-square, butt the masking sheet up against blade of T-square to ensure masking sheet is squarely aligned.

Figure 1


Press sheet size
Masking sheet
Perpendicular centerline (based on job sheet size)
Centerline
Plate bend line (leading edge of press sheet)
Gripper margin

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☐ 4. Using masking tape, tape down the top left and right hand corners of the sheet.

Note: Make sure masking sheet is still square after taping.

☐ 5. Determine the plate bend and measure down from the gripper edge of the masking sheet.

☐ 6. Rule across the bend mark on the masking sheet using a ballpoint pen.

Note: This line represents the top edge of the printed sheet and is also called the paper line (Figure 1).

☐ 7. Measure down from plate bend the amount of space required for the gripper bite and rule another line parallel to the plate bend line (Figure 1).

☐ 8. Measure down 11" (if using an $8^1/2$" x 11" sheet) from the line drawn in step 6 and draw another rule across the sheet (Figure 1).

☐ 9. Using the ruler, find the center point perpendicular to the plate bend line.

☐ 10. Use the T-square (and triangle, if necessary) to rule the centerline (Figure 1).

☐ 11. Measure $4^1/4$" (if using an $8^1/2$" x 11" sheet) on each side of centerline and make mark.

☐ 12. Use T-square (and triangle, if necessary) to draw rules on the $4^1/4$" marks.

Note: These two lines represent the left and right edges of the printed sheet (Figure 1).

☐ 13. To complete the flat, draw another centerline perpendicular to the existing centerline. This centerline should be one-half the distance of the page size (Figure 1).

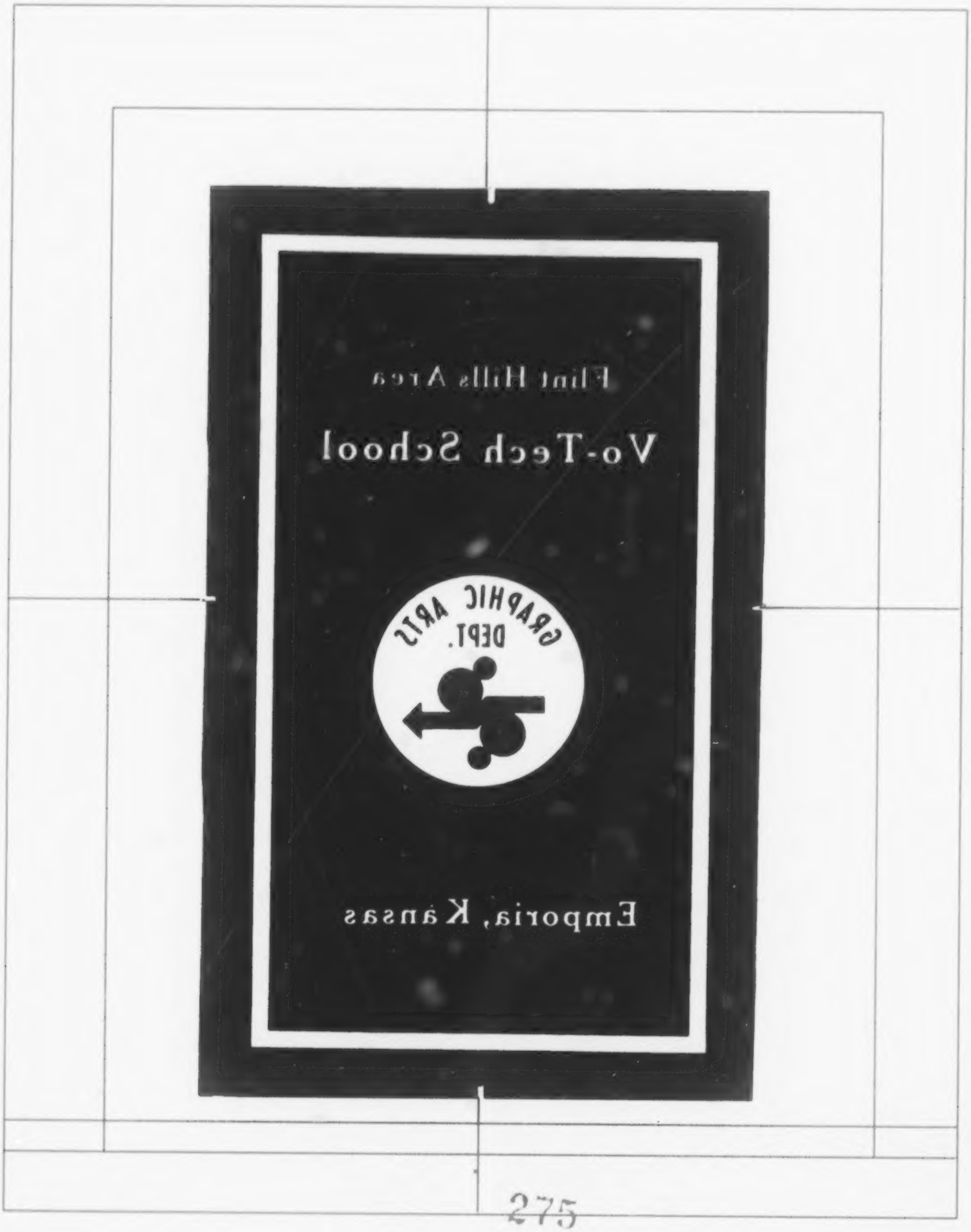
☐ 14. Position negative emulsion up (backward reading) on the masking sheet so the vertical and horizontal center marks on the negative are in alignment with the centerlines on the masking sheet. Double check image alignment on negative to be sure it is square (Figure 2).

☐ 15. Use red lithographer's tape and tape negative to masking sheet by using a small piece of tape in each of the four corners.

☐ 16. Remove masking tape from top corners of masking sheet and turn over so negative faces down on light table (image should now be right reading).

☐ 17. Turn on light table so image area of negative can be seen through the flat.

Figure 2


Flint Hills Area
Vo-Tech School
GRAPHIC ARTS
DEPT.
Emporia, Kansas

☐ 18. Using the stripping knife, cut away masking sheet to expose all of the image area. This is referred to as opening up a window.

Note: Cut no closer than 1/4" to any part of the type or image. Hot spots will occur while platemaking if less than 1/4" is allowed.

☐ 19. Use opaque solution and brush (or pen) to cover any imperfection such as a scratch or pinhole that may allow light to pass through the nonimage area of the negative.

☐ 20. Give completed flat to instructor for evaluation.

☐ 21. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

____________________________________________

____________________________________________

**Objective 11**

## Job Sheet 4—Strip a Flat for Single Color Envelopes

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Negative properly stripped in centerline position on masking sheet below gripper margin | ______ |
| • Negative aligned and window opened up correctly | ______ |
| • Imperfections in negative properly opaqued out | ______ |

**Basic Skills**

Reading Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Tape dispenser with masking tape and lithographer's tape
- Stripping knife
- Opaque brush and opaque solution or opaque pen
- 10″ x 15″ ruled masking sheet
- Line negative for envelope return address

**Procedure**

☐ 1. Using T-square, position 10″ x 15″ masking sheet square on light table with gripper margin on top. Tape to table with masking tape at top.

☐ 2. Turn on light table.

☐ 3. Position line negative and strip negative in centerline position directly below the gripper margin.

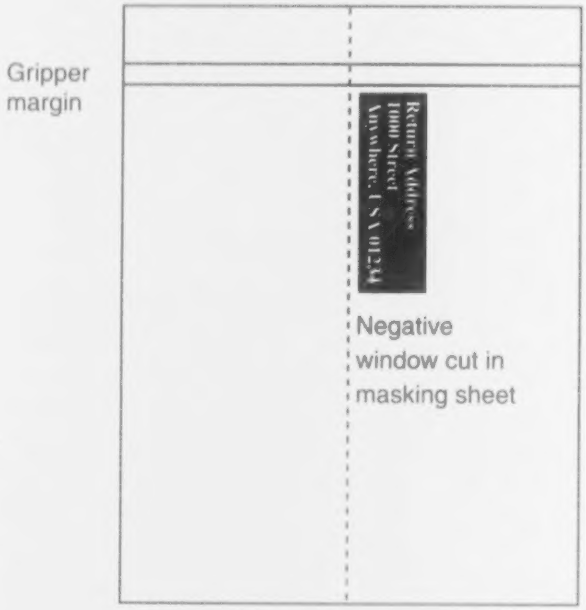
☐ 4. Check image on negative with T-square to make sure image is square on flat.

☐ 5. Hold negative in aligned position with left hand and secure lower right hand corner to masking sheet with lithographer's tape.

☐ 6. Leave top edge of masking sheet taped to light table and flip flat over to tape remaining two corners of negative.

☐ 7. Flip flat back over and use stripping knife to open image area by cutting masking sheet (Figure 1).

Figure 1


Gripper margin
Return Address
1000 Street
Anywhere, USA 01234
Negative window cut in masking sheet

☐ 8. Use opaque brush and opaque solution or opaque pen to cover any pinholes or scratches in exposed negative area.

☐ 9. Give completed flat to instructor for evaluation.

☐ 10. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ____________________

____________________

____________________

**Objective 12**

## Job Sheet 5—Strip a Flat for Single Color Work and Turn Imposition

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Negative properly stripped in position on masking sheet below gripper margin | ______ |
| • Negatives aligned and windows opened up correctly | ______ |
| • Imperfections in negatives properly opaqued out | ______ |

**Basic Skills**

Reading Mathematics Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Black ballpoint pen (medium point)
- Triangle
- Printer's line gauge or centering rule
- Tape dispenser with masking tape and lithographer's tape
- Stripping knife
- Opaque brush and opaque solution or opaque pen
- 10″ x 15″ unruled masking sheet
- Two line negatives for 4 1/4″ x 11″ for work and turn assembly on an 8 1/2″ x 11″ sheet

**Procedure**

☐ 1. Obtain the correct size masking sheet.

☐ 2. Turn on light table.

☐ 3. Position the masking sheet on the light table; check with instructor for orientation of gripper edge.

☐ 4. Using the T-square, butt the masking sheet up against the blade of T-square to ensure masking sheet is squarely aligned.

☐ 5. Using masking tape, tape down the top left and right hand corners of the sheet.

☐ 6. Determine the plate bend and measure down from the gripper edge of the masking sheet.

☐ 7. Rule across the bend mark on the masking sheet using a black ballpoint pen.

☐ 8. Measure down from the plate bend the amount of space required for the gripper bite and rule another line parallel to the plate bend line (Figure 1).

☐ 9. Measure down 11″ from the line drawn in step 7 and draw another rule across the sheet (Figure 1).

☐ 10. Using the ruler, find the center of the masking sheet and rule in the vertical centerline utilizing your triangle and T-square.

☐ 11. Measure 4¼″ on each side of centerline mark (Figure 1).

☐ 12. Use the T-square and triangle to rule the centerline and the lines in step 11 (Figure 1).

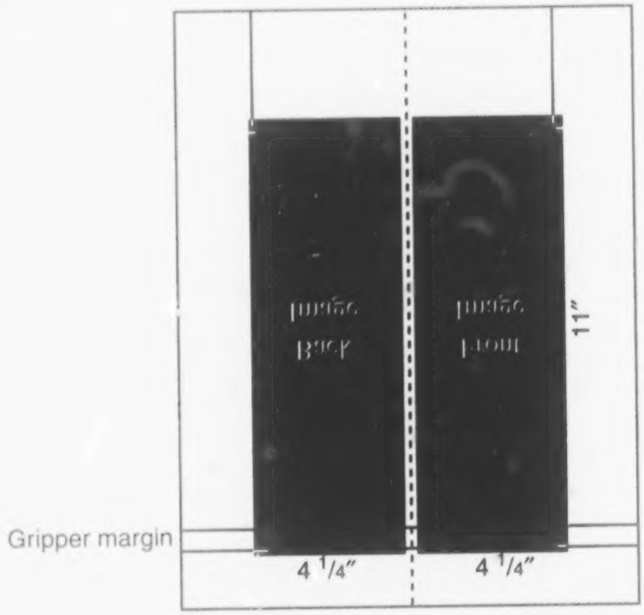
☐ 13. Position the negative for the front of the work and turn emulsion up (wrong reading) on the masking sheet so the trim marks match up with the lines on the right hand side. Double check image alignment with T-square to ensure that it is square (Figure 1).

☐ 14. Use lithographer's tape and tape negative to masking sheet by using a small piece of tape at the top, bottom, right hand corners top and bottom, and right side.

☐ 15. Trim the left hand side of the negative removing both trim marks on the left.

☐ 16. Position the negative for the back of the work and turn emulsion up (wrong reading) on the masking sheet so the trim marks match up with the lines on the left hand side. Double check image alignment with T-square to ensure that it is square (Figure 1).

Figure 1



☐ 17. Use lithographer's tape and tape negative to masking sheet by using a small piece of tape at the top, bottom, left hand corners top and bottom, and left side.

☐ 18. Trim the right hand side of the negative removing both trim marks on the right.

☐ 19. Use small pieces of lithographer's tape to attach the untaped corners of both the front and back negative to the masking sheet.

☐ 20. Remove masking tape from top corners of masking sheet and turn over so negative faces down on light table (image should now be right reading).

☐ 21. Using the stripping knife, cut away masking sheet to expose all of the image area. This is referred to as opening up a window.

☐ 22. Use opaque solution and opaque brush (or opaque pen) to cover any imperfections in the negatives.

☐ 23. Give completed flat to instructor for evaluation.

☐ 24. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ____________________

**Objective 13**

## Job Sheet 6—Strip a Flat for Single Color Work and Tumble Imposition

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Negative properly stripped in position on masking sheet below gripper margin | ______ |
| • Negative aligned and windows opened up correctly | ______ |
| • Imperfections in negatives properly opaqued out | ______ |

**Basic Skills**

Reading Mathematics Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Black ballpoint pen (medium point)
- Triangle
- Printer's line gauge or centering rule
- Tape dispenser with masking tape and lithographer's tape
- Stripping knife
- Opaque brush and opaque solution or opaque pen
- 10″ x 15″ unruled masking sheet
- Two line negatives for 8$^1/_2$″ x 5$^1/_2$″ for work and tumble assembly on an 8$^1/_2$″ x 11″ sheet

**Procedure**

☐ 1. Obtain the correct size masking sheet.

☐ 2. Turn on light table.

☐ 3. Position the masking sheet on the light table; check with instructor for orientation of gripper edge.

☐ 4. Using the T-square, butt the masking sheet up against the blade of T-square to ensure masking sheet is squarely aligned.

☐ 5. Using masking tape, tape down the top left and right hand corners of the sheet.

☐ 6. Determine the plate bend and measure down from the gripper edge of the masking sheet.

☐ 7. Rule across the bend mark on the masking sheet using a black ballpoint pen.

☐ 8. Measure down from the plate bend the amount of space required for the gripper bite and rule another line parallel to the plate bend line (Figure 1).

☐ 9. Measure down 11″ from the line drawn in step 7 and draw another rule across the sheet (Figure 1).

☐ 10. Using the ruler, find the center point perpendicular to the plate bend line and rule it in (Figure 1).

☐ 11. Use the T-square and triangle to rule the vertical centerline (Figure 1).

☐ 12. Measure 4¼″ on each side of centerline and make a mark.

☐ 13. Use triangle to draw rules on the 4¼″ marks.

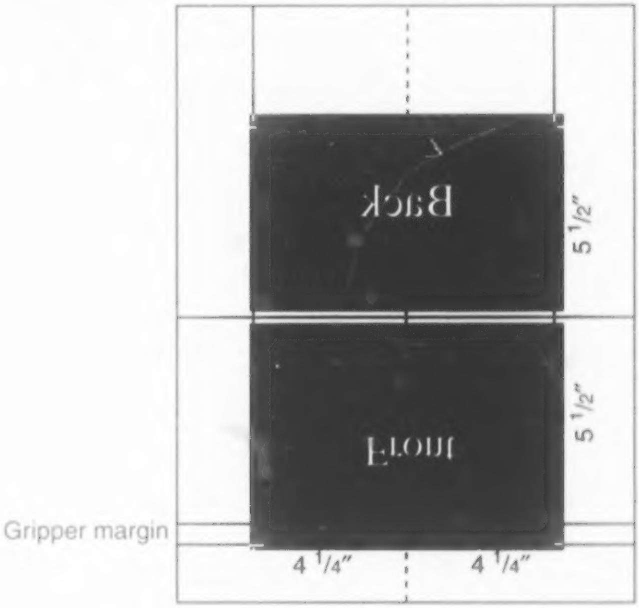
☐ 14. Position the negative for the front of the work and tumble emulsion up (wrong reading) and right side up on the masking sheet so the trim marks match up with the lines on the top half. Double check image alignment with T-square to ensure that it is square (Figure 1).

☐ 15. Use lithographer's tape and tape negative to masking sheet by using a small piece of tape at the top, both top corners, left side, and right side.

☐ 16. Trim the bottom of the negative removing both trim marks on the bottom.

☐ 17. Position the negative for the back of the work and tumble emulsion up (wrong reading) and upside down on the masking sheet so the trim marks match up with the lines on the bottom. Double check image alignment with T-square to ensure that it is square (Figure 1).

Figure 1



☐ 18. Use lithographer's tape and tape negative to masking sheet by using a small piece of tape on both bottom corners, left hand side, and right side.

☐ 19. Trim the top of the negative removing both trim marks on the top.

☐ 20. Use small pieces of lithographer's tape to attach the untaped corners of both the front and back negative to the masking sheet.

☐ 21. Remove masking tape from top corners of masking sheet and turn over so negative faces down on light table (image should now be right reading).

☐ 22. Using the stripping knife, cut away masking sheet to expose all of the image area (open window).

☐ 23. Use opaque solution and opaque brush (or opaque pen) to cover any imperfections in the negatives.

☐ 24. Give completed flat to instructor for evaluation.

☐ 25. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________

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**Objective 14**

## Job Sheet 7—Strip for Step-and-Repeat

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Negative properly stripped in centerline position of masking sheet | ______ |
| • V-shaped notches cut in correct locations | ______ |
| • Imperfections in negative properly opaqued out | ______ |

**Basic Skills**

Reading

Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Tape dispenser with masking tape and lithographer's tape
- Stripping knife
- Opaque brush and opaque solution
- 10″ x 15″ ruled masking sheet
- 2″ x 3″ trimmed line negative
- Spare 10″ x 15″ masking sheet

**Procedure**

☐ 1. Using T-square, position 10″ x 15″ masking sheet square on light table with gripper margin at the top.

Note: If this position of the gripper edge at the top is maintained throughout the stripping/platemaking process by all personnel, consistent image positioning is better achieved.

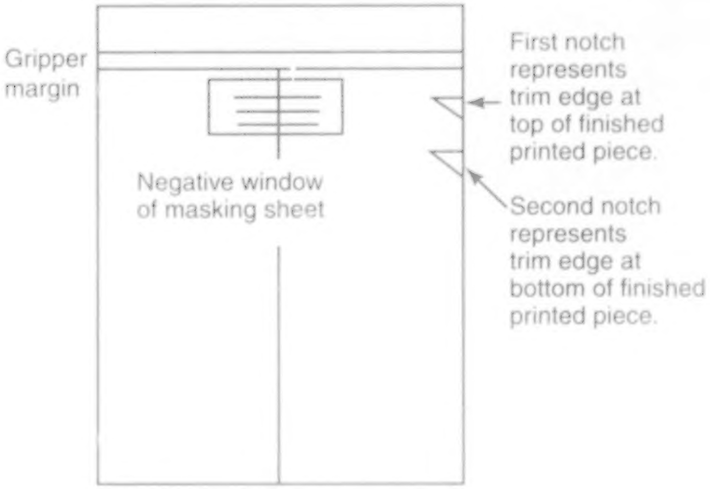
☐ 2. Position negative and strip negative in centerline position.

☐ 3. Check image on negative with T-square to make sure image is square on flat.

☐ 4. Line up T-square with ruled line on masking sheet which represents the top edge of the finished printed sheet.

☐ 5. Using the stripping knife, cut a 1/4" V-shaped notch in the right side of the masking sheet on the line representing the top edge of the finished printed piece (Figure 1).

Figure 1


Gripper margin
First notch represents trim edge at top of finished printed piece.
Negative window of masking sheet
Second notch represents trim edge at bottom of finished printed piece.

☐ 6. Move the T-square down (or to your right on the masking sheet) and line up with the ruled line on the masking sheet representing the bottom edge of the finished printed sheet.

☐ 7. Cut a second 1/4" notch on the same right edge of the masking sheet along position of T-square in step 6 (Figure 1).

☐ 8. Use opaque brush and opaque solution to cover any pinholes or scratches in exposed negative area.

Note: When the first exposure (burn) is completed, the flat is repositioned by matching the #1 notch on the flat with the exposure mark left by notch #2 during the first exposure. An additional masking sheet is placed over the previously exposed part of the plate for each additional exposure. A slight change of color will be noticed where the notch openings were exposed to light during the first burn, which may be removed with deletion fluid or eraser.

☐ 9. Give flat to instructor for evaluation.

Note: Save flat for use in Unit 7, Job Sheet 3.

☐ 10. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________

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**Objective 15**

## Job Sheet 8—Strip a Single Color Flat for a 4-Page Signature

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Negatives aligned and windows opened up correctly | ______ |
| • Negatives in proper positions | ______ |
| • Trim marks open | ______ |
| • Imperfections in negatives properly opaqued out | ______ |

**Basic Skills**

Reading Mathematics

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Tape dispenser with masking tape and lithographer's tape
- Black ballpoint pen (medium point)
- Triangle
- Printer's line gauge or centering rule
- Stripping knife
- Opaque brush and opaque solution or opaque pen
- 11" x 18" unruled masking sheet
- Four line negatives

Note: Each of the line negatives should have an image area of $3\frac{3}{4}''$ x $4\frac{3}{4}''$.

**Procedure**

☐ 1. Obtain the correct size masking sheet.

☐ 2. Obtain the necessary negatives.

☐ 3. Position the masking sheet on the light table; check with instructor for orientation of gripper edge.

☐ 4. Using the T-square, butt the masking sheet up against the blade of T-square to ensure masking sheet is squarely aligned.

☐ 5. Using masking tape, tape down the top left and right hand corners of the sheet.

☐ 6. Determine the plate bend and measure down from the gripper edge of the masking sheet.

☐ 7. Rule across the bend mark on the masking sheet using a black ballpoint pen.

☐ 8. Measure down from the plate bend the amount of space required for the gripper bite and rule another line parallel to the plate bend line (Figure 1).

☐ 9. Measure down 9³/₄″ from the line drawn in step 7 and draw another rule across the sheet (Figure 1).

☐ 10. Using the ruler, find the center point perpendicular to the plate bend line and rule it in (Figure 1).

☐ 11. Measure ¹/₈″ above and below the line ruled in step 10 and rule both in.

☐ 12. Use the T-square and triangle to rule the vertical centerline (Figure 1).

☐ 13. Measure 3³/₄″ on each side of centerline and make a mark.

☐ 14. Use the T-square and triangle to draw rules on the 3³/₄″ marks.

☐ 15. Position the negative for page 1 in the position indicated in figure 1, emulsion up (wrong reading) and right side up on the masking sheet so the trim marks match up with the lines ruled on the flat. Double check image alignment with T-square to ensure that it is square (Figure 1).

☐ 16. Use lithographer's tape and tape negative for page 1 to masking sheet by using a small piece of tape at the left side and bottom.

☐ 17. Trim the right side of the negative removing both trim marks and attach with very small pieces of tape to the masking sheet.

☐ 18. Position the negative for page 4 in the position indicated in figure 1, emulsion up (wrong reading) and right side up on the masking sheet so the trim marks match up with the lines ruled on the flat. Double check image alignment with T-square to ensure that it is square (Figure 1).

☐ 19. Use lithographer's tape and tape negative to masking sheet by using a small piece of tape on left side, right side, top, and bottom.

☐ 20. Use small pieces of lithographer's tape to attach the untaped corners of both the front and back negative to the masking sheet.

☐ 21. Position the negative for page 3 in the position indicated in Figure 1 emulsion up (wrong reading) and right side up on the masking sheet so the trim marks match up with the lines ruled on the flat. Double check image alignment with T-square to ensure that it is square (Figure 1).

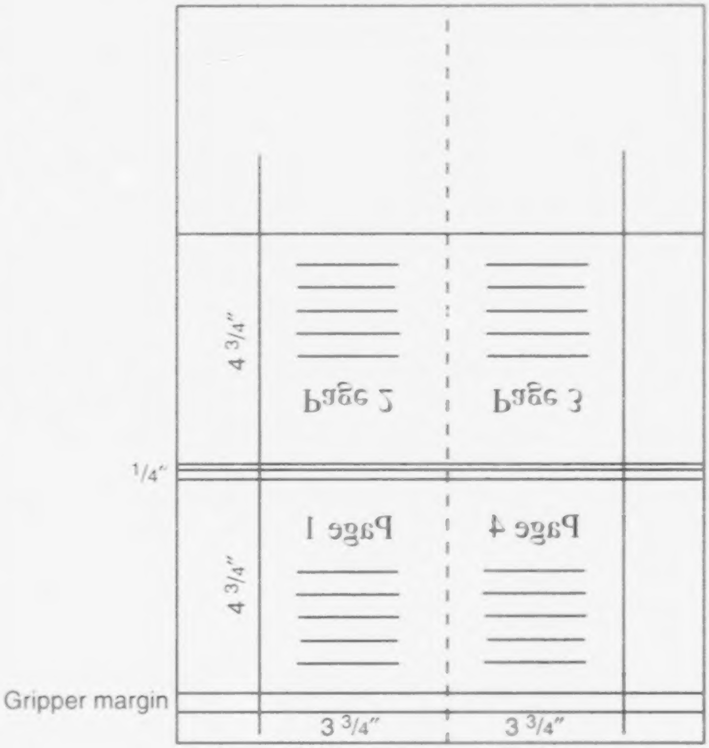
☐ 22. Use lithographer's tape and tape negative to masking sheet by using a small piece of tape on right side, top, and bottom.

☐ 23. Trim the left side of the negative removing both trim marks.

☐ 24. Use a very small piece of tape to attach the left side of the negative to the masking sheet.

☐ 25. Position the negative for page 2 in the position indicated in Figure 1 emulsion up (wrong reading) and right side up on the masking sheet so the trim marks match up with the lines ruled on the flat. Double check image alignment with T-square to ensure that it is square (Figure 1).

Figure 1



☐ 26. Use lithographer's tape and tape negative to masking sheet by using a small piece of tape on left side, right side, top, and bottom.

☐ 27. Carefully remove the masking tape at the top of the flat and flip it over.

☐ 28. Using the stripping knife, cut away masking sheet to expose all of the image areas (open windows) and trim marks.

☐ 29. Use opaque solution and opaque brush (or opaque pen) to cover any imperfections in the negatives.

☐ 30. Give completed flat to instructor for evaluation.

☐ 31. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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**Objective 16**

# Job Sheet 9—Lay Out Signature Flats and Strip a Single Color Flat for an 8-Page Signature

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Imposition guide correctly folded and numbered | ______ |
| • Masking sheets correctly marked | ______ |
| • Negatives aligned and windows opened up correctly | ______ |
| • Negatives in proper positions | ______ |
| • Trim marks open | ______ |
| • Imperfections in negatives properly opaqued out | ______ |

**Basic Skills**

Reading Mathematics Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Note: Instructor may expand this job sheet to include 16 or 32-page signatures and either saddle-stitch or side-bound formats.

**Tools, equipment, and materials**

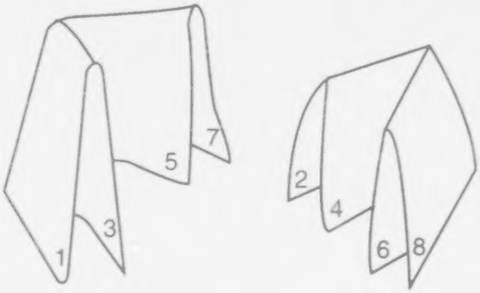
- Light table
- T-square
- Black ballpoint pen
- Triangle
- Printer's line gauge or centering rule
- Stripping knife
- Tape dispenser with masking and lithographer's tape
- Opaque brush and opaque solution or opaque pen
- Blank sheet of paper, size 11″ x 17″
- Two 11″ x 18″ unruled masking sheets
- Eight line negatives
  Note: Each line negative should have an image area of 4¼″ x 5½″.
- Black felt tip pen

**Procedure**

☐ 1. Fold the 11″ x 17″ sheet in half and then into a quarter fold.

☐ 2. Holding folded edges at left and top, number lower right corner of sheets from 1 through 8 (Figure 1).

Figure 1



☐ 3. Unfold the marked sheet, now called an imposition guide.

Note: Be sure to have instructor show you how to identify the gripper edge and side guide as it relates to a particular press and folding machine.

☐ 4. Obtain the correct size masking sheets.

☐ 5. Obtain the necessary negatives.

☐ 6. Position one masking sheet on the light table.

Note: Check with instructor for orientation of gripper edge, plate bend, and gripper margin dimensions.

☐ 7. Using the T-square, butt the masking sheet up against the blade of T-square to ensure masking sheet is squarely aligned.

☐ 8. Using masking tape, tape down the top left and right hand corners of the sheet.

☐ 9. Determine the plate bend and measure down from the gripper edge of the masking sheet.

☐ 10. Rule across the bend mark on the masking sheet using a black ballpoint pen.

☐ 11. Measure down the plate bend the amount of space required for the gripper bite and rule another line parallel to the plate bend line (Figure 2).

☐ 12. Measure down 11″ from the line drawn in step 10 and draw another rule across the sheet (Figure 2).

☐ 13. Using the ruler, find the center point perpendicular to the plate bend line and rule it in (Figure 2).

☐ 14. Use the T-square and triangle to rule the vertical centerline (Figure 2).

☐ 15. Measure 4¹/4″ on each side of centerline and make a mark.

☐ 16. Use triangle to draw rules on the 4¹/4″ marks.

☐ 17. Position the negative for page 1 in the position indicated in figure 1 emulsion up (wrong reading) and right side up on the masking sheet so the trim marks match up with the lines ruled on the flat. Double check image alignment with T-square to ensure that it is square (Figure 2).

☐ 18. Use lithographer's tape and tape negative for page 1 to masking sheet by using a small piece of tape at the left side and bottom.

☐ 19. Trim the right side of the negative removing both trim marks and attach with very small pieces of tape to the masking sheet.

☐ 20. Position the negative for page 8 in the position indicated in figure 1 emulsion up (wrong reading) and right side up on the masking sheet so the trim marks match up with the lines ruled on the flat. Double check image alignment with T-square to ensure that it is square (Figure 2).

☐ 21. Use lithographer's tape and tape negative to masking sheet by using a small piece of tape on left side, right side, top, and bottom.

☐ 22. Use small pieces of lithographer's tape to attach the untaped corners of both the front and back negative to the masking sheet.

☐ 23. Position the negative for page 5 in the position indicated in figure 2 emulsion up (wrong reading) and right side up on the masking sheet so the trim marks match up with the lines ruled on the flat. Double check image alignment with T-square to ensure that it is square (Figure 2).

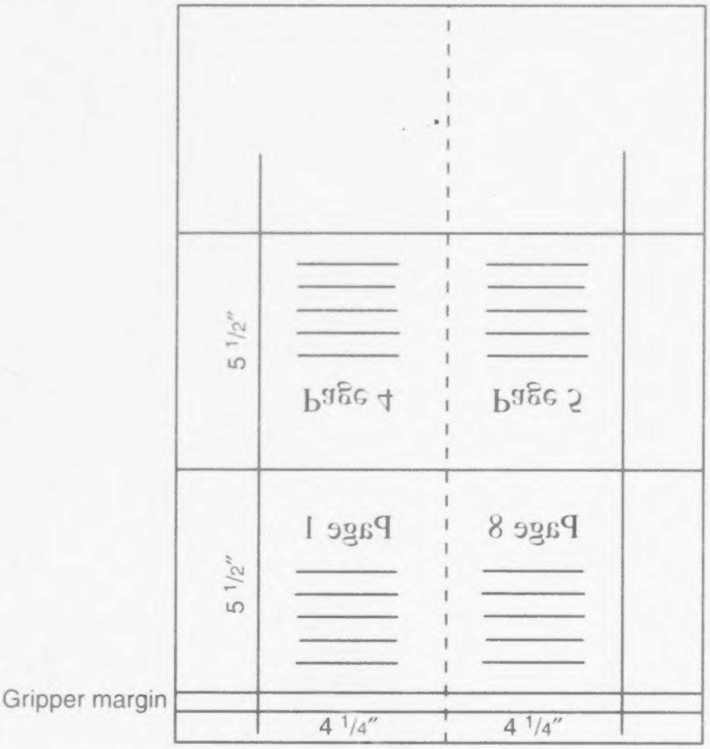
☐ 24. Use lithographer's tape and tape negative to masking sheet by using a small piece of tape on right side, top, and bottom.

☐ 25. Trim the left side of the negative removing both trim marks.

☐ 26. Use very small pieces of tape to attach the left side of the negative to the masking sheet.

☐ 27. Position the negative for page 4 in the position indicated in figure 2 emulsion up (wrong reading) and right side up on the masking sheet so the trim marks match up with the lines ruled on the flat. Double check image alignment with T-square to ensure that it is square (Figure 2).

Figure 2



☐ 28. Use lithographer's tape and tape negative to masking sheet by using a small piece to tape on left side, right side, top, and bottom.

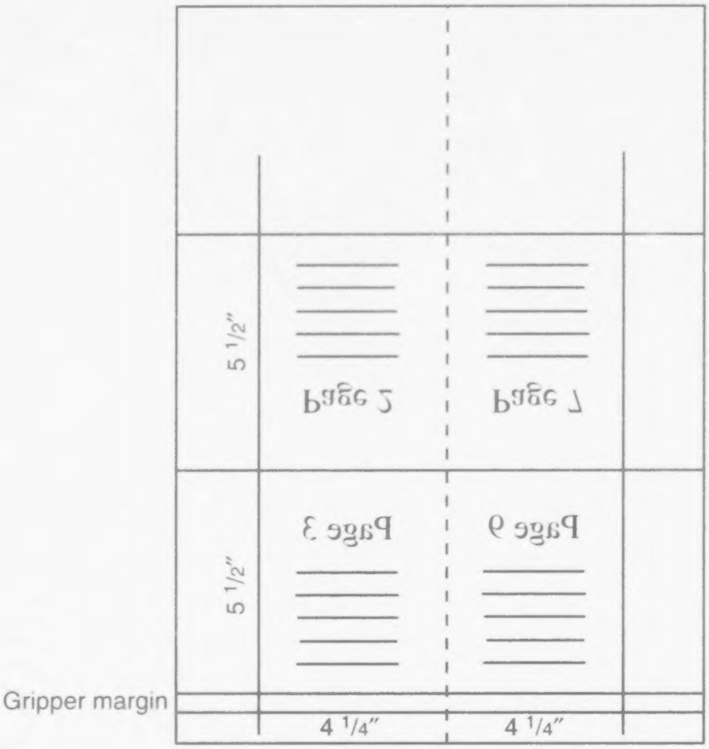
☐ 29. Carefully remove the masking tape at the top of the flat and flip it over.

☐ 30. Using the stripping knife, cut away masking sheet to expose all of the image areas (open windows) and trim marks.

☐ 31. Use opaque solution and brush (or pen) to cover any imperfections in the negatives.

☐ 32. Repeat steps 6 through 31 with the second masking sheet and pages 2, 3, 7, and 9. Refer to figure 3 for position of negatives (Figure 3).

Figure 3


Page 2
Page 7
Page 3
Page 9
5 1/2"
5 1/2"
Gripper margin
4 1/4"
4 1/4"

☐ 33. Give completed flats to the instructor for evaluation.

☐ 34. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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**Objective 17**

## Job Sheet 10—Strip a Single Color Step-and-Repeat Using Pin Register

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Template ruled accurately | ______ |
| • Filters accurately placed and assembled onto template and image carrier | ______ |
| • Negative aligned and window opened up correctly | ______ |
| • Imperfections in negative properly opaqued out | ______ |

**Basic Skills**

Reading Mathematics Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Stripping knife
- Tape dispenser with masking and lithographer's tape
- Opaque brush and opaque solution or opaque pen
- 12″ x 18″ unruled masking sheet (preferably orange vinyl)
- 11″ x 14″ unruled masking sheet (preferably orange vinyl)
- 11″ x 14″ clear film (polyester)
- Line gauge or center ruler
- Single-hole punch
- Eight film hole fitters (punched from scrap film using ordinary $^{1}/_{4}$″ hand punch)
- Two stripping pins
- One negative for stepping with trim marks and center marks $7^{1}/_{2}$″ x $2^{1}/_{4}$″

**Procedure**

☐ 1. Square up 12″ x 18″ masking sheet on light table, taping it on the top and bottom edges.

☐ 2. Measure and draw a vertical centerline (Figure 1).

☐ 3. Measure and draw a plate-edge line $1^{1}/_{4}$″ from the bottom edge of sheet.

☐ 4. From the bottom trim line, measure and draw in the three other horizontal lines at 2$\frac{1}{4}$″ increments (Figure 1).

Note: These will establish the trim lines for the three repeat images.

☐ 5. From the vertical centerline, measure and draw trim lines 3″ to the right and left of the centerline (Figure 1).

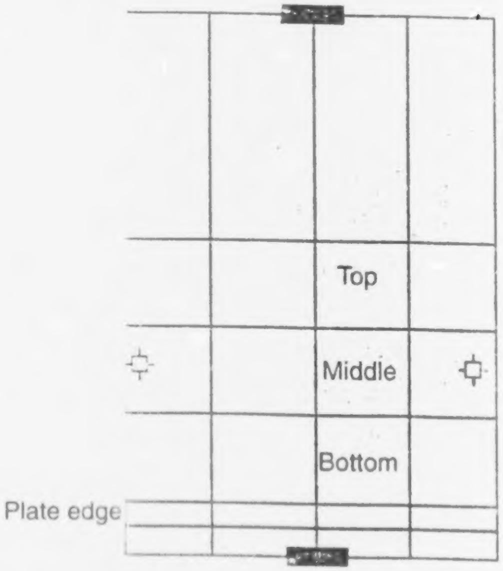
☐ 6. Mark the three areas starting from the top: "Top, Middle, and Bottom" (Figure 1).

☐ 7. Double check your lines to see if you have the correct dimensions.

☐ 8. Draw two short vertical lines within the middle stepping area. Draw lines $\frac{1}{2}$″ in from both the right and left edges of the template (Figure 1).

☐ 9. Measure and draw short horizontal lines about 1″ up from the lower chop line. These lines should intersect the vertical lines (Figure 1).

Figure 1—Creating the template



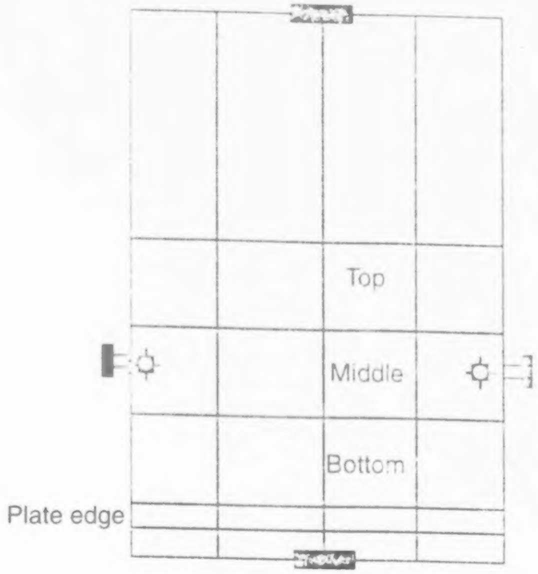
☐ 10. Cut two small holes, about $\frac{1}{4}$″ in size where the lines intersect.

☐ 11. Insert a register pin through the hole on the right side and place a film-hole fitter over the pin. Tape fitter to the template.

☐ 12. Tape the register pin to the table, applying tape to three edges of the pin to hold it securely.

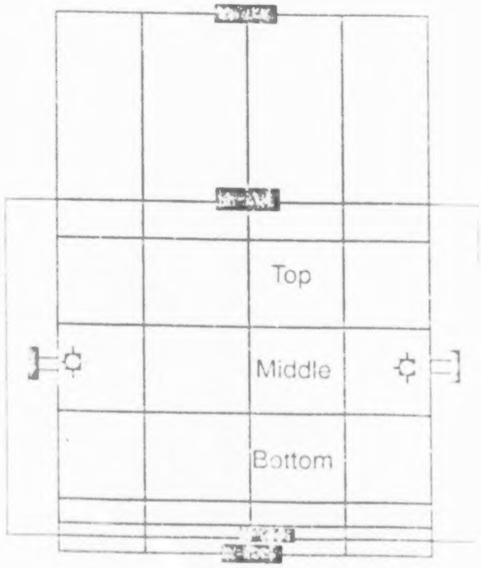
☐ 13. Follow the same procedures used in steps 11 and 12 to place the fitter on the left side. This will complete your tabbing for the middle stepping position (Figure 2).

Figure 2



☐ 14. Center the 11″ x 14″ clear film with its long dimension placed across the template and tape down its top and bottom edges (Figure 3).

Figure 3—Attaching negative carrier to the template



☐ 15. Cut openings in the film for the pins to come through and place fitters onto the pins.

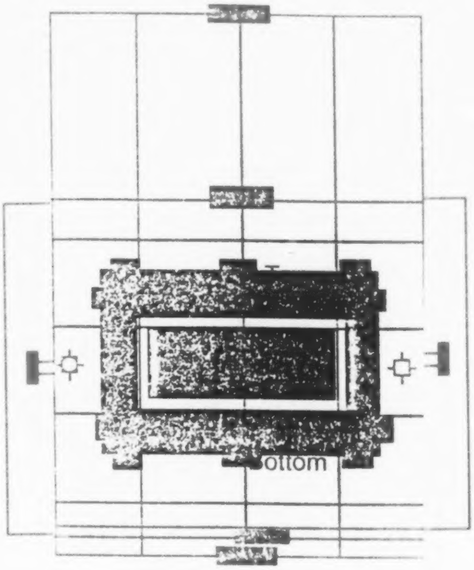
☐ 16. Smooth down the film with the side of your hand and tape down the fitters.

☐ 17. Place your negative (image wrong-reading, emulsion up) onto the clear film, aligning the marks on the negative to the chop cut lines and centerline of the template (Figure 4).

Note: Use only the center marks of the negative if all the marks don't align.

☐ 18. Tape the negative at the top left edge and check image squareness with your T-square. Then finish taping the film corners and edges (Figure 4).

Figure 4—Negative positioned with middle stepping position



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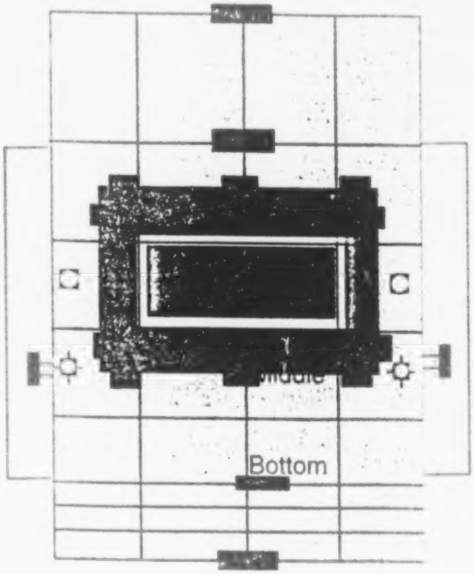
☐ 19. Remove the negative carrier from the template, and slide the carrier up to the top stepping position (Figure 5).

Figure 5—Negative positioned with top stepping position



☐ 20. Align the center marks of the negative with the chop cut line and centerline of template.

☐ 21. Tape the top and bottom edges of the carrier to hold it in place.

☐ 22. Turn over the template, with the negative-carrier attached, and place the fitters of the negative-carrier over the pins (Figure 6).

☐ 23. Cut small openings in the template to allow the pins to come through (Figure 6).

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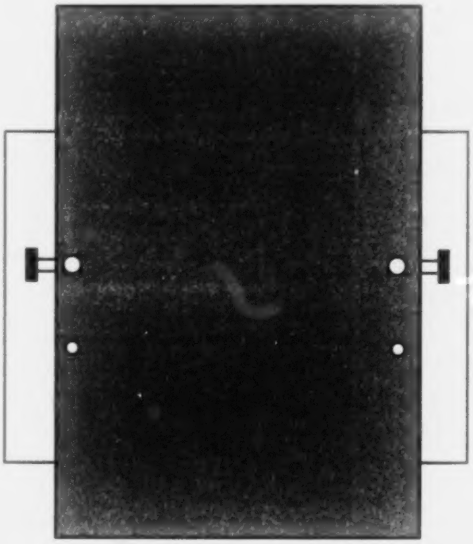
☐ 24. Place fitters over the pins, smooth down the template, and tape the fitters to the template. This step establishes the pin-register position for the top image exposure (Figure 6).

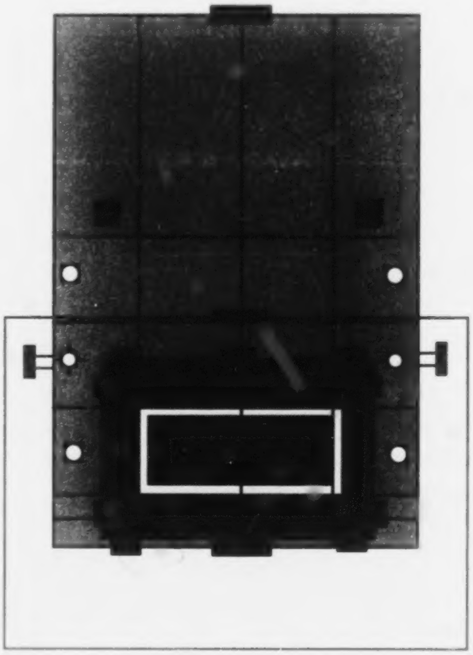
Figure 6—Pin register established for top image exposure



☐ 25. Now flop the template so the negative-carrier is facing up. Place the template on the pins. Untape the carrier and slide it down to the bottom stepping position, aligning the marks of the negative with the template lines (Figure 7).

☐ 26. Tape the top edge of the negative-carrier in two places to hold it in place (Figure 7).

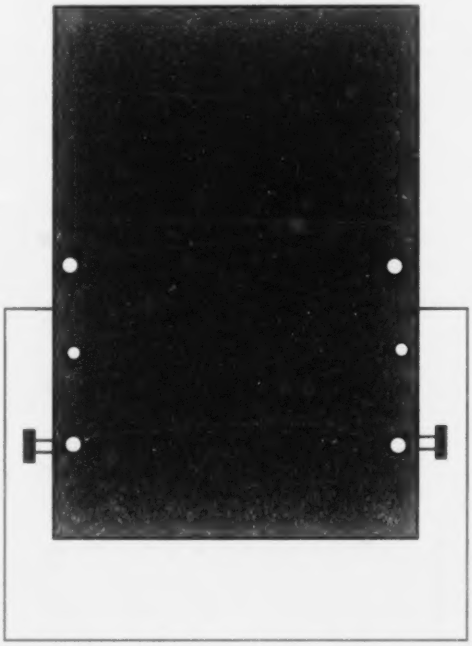
Figure 7—Negative positioned with bottom stepping position



☐ 27. As in step 22, turn over the template with the carrier attached and insert register pins into the fitters of the carrier (Figure 8).

☐ 28. Cut openings in the template for the pins. Tape new fitters into place on the template to establish the pin-register position for the bottom image exposure (Figure 8).

Figure 8—Pin register established for bottom image exposure

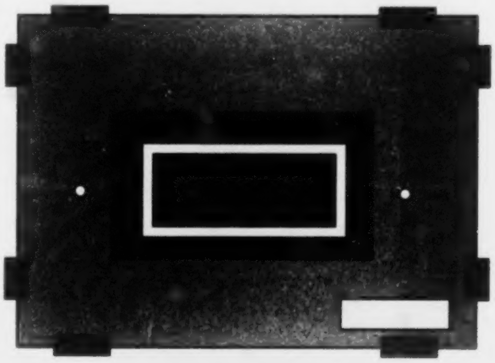


☐ 29. Flop the template so the negative-carrier is facing up and remove the negative carrier from the template. Place the template aside.

☐ 30. Mask the negative carrier with the 11″ x 14″ masking sheet. Tape securely (Figure 9).

☐ 31. Open a window for the printing image and trim marks (Figure 9).

Figure 9—Negative carrier masked with window

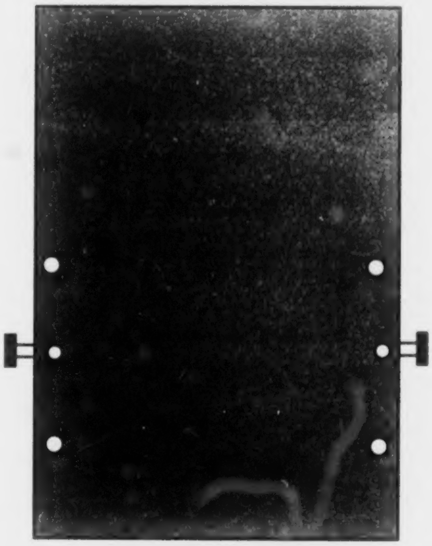


☐ 32. Label the flat: "Negative-Carrier 3-Up, Vertical Step-and-Repeat."

☐ 33. Opaque any imperfections on the negative.

☐ 34. Place the template on the light table with drawn lines facing down (Figure 10).

Figure 10



304

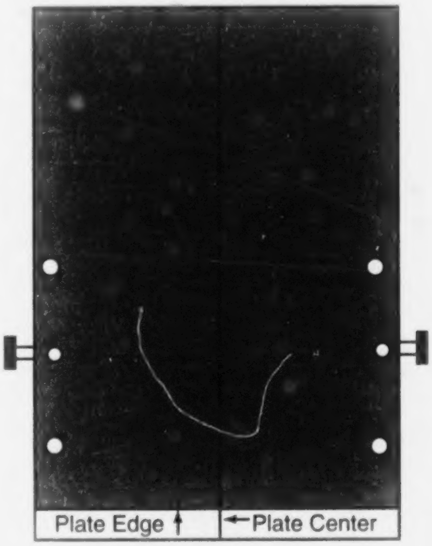
☐ 35. Trace over the vertical centerline and plate-edge line to establish index lines for positioning the plate (Figure 11).

☐ 36. Label the flat "Template—3-Up, Vertical Step-and-Repeat."

☐ 37. Label the plate-edge line and plate centerline (Figure 11).

Note: This completes your work in preparing the template and negative carrier for pin-register step-and-repeat.

Figure 11—Establishing guidelines for the position of plate on the template



☐ 38. Give template and negative carrier to instructor for evaluation.

☐ 39. Clean your work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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**Objective 18**

## Job Sheet 11—Combine Line and Halftone Work

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Line negative properly stripped to masking sheet | ______ |
| • Halftone negative positioned over window and secured with adhesive | ______ |
| • Masking sheet cut away to expose all images | ______ |
| • Imperfections in line negative opaqued | ______ |

**Basic Skills**

Reading

Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Stripping knife
- Tape dispenser with masking tape and lithographer's tape
- Spray adhesive
- Line negative with halftone window
- Halftone negative
- Appropriate masking sheet
- Scissors
- Opaque solution and opaque brush

**Procedure**

☐ 1. Strip line negative to masking sheet.

☐ 2. Turn masking sheet over and position halftone negative over windows so $^1/_4$" of negative laps over edge of window on all four sides.

☐ 3. Make sure the emulsion sides of both the line and halftone negatives are facing up.

☐ 4. Spray base side of negative with adhesive. This eliminates the use of tape, which causes hot spots during plating.

☐ 5. Cut away masking sheet to expose all images.

☐ 6. Opaque any pinholes or scratches on line negative.

☐ 7. Turn in completed flat to instructor for evaluation.

☐ 8. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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**Objective 19**

## Job Sheet 12—Strip for Combination Print (Double Burn With Screen Tint)

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Negatives aligned and windows opened up correctly | ______ |
| • Negatives properly registered | ______ |
| • Open register marks covered with lithographer's tape | ______ |
| • Imperfections in negatives properly opaqued out | ______ |

**Basic Skills**

Reading

Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Stripping knife
- Black ballpoint pen (medium point)
- Triangle
- Printer's line gauge or centering rule
- Tape dispenser with masking tape and lithographer's tape
- Opaque brush and opaque solution or opaque pen
- Two 10″ x 15″ ruled masking sheets
- Two line negatives

  Note: The first line negative should include typographical material and register marks. The second line negative should include graphic element(s) with register marks that correspond with the first negative. The second negative will be used to burn the plate with a screen tint.

**Procedure**

☐ 1. Obtain necessary negatives.

☐ 2. Strip the first negative that contains type into position on masking sheet; strip negative underneath masking sheet with emulsion down.

☐ 3. Open up mask over register marks and image of line negative.

☐ 4. Register second negative by using register marks.

Note: This negative will be used for the screen tint.

☐ 5. Tape second negative to primary flat with masking tape to maintain register between the two negatives.

☐ 6. Align second masking sheet with primary masking sheet and tape into position using masking tape.

☐ 7. Attach second negative to second masking sheet using lithographer's tape.

☐ 8. Release masking tape and separate primary and secondary flats.

☐ 9. Open up the window in mask over image area in secondary flat.

☐ 10. Do necessary opaquing on both negatives.

☐ 11. Use red lithographer's tape to cover up any open register marks.

Note: Register marks for double burning are used primarily for image alignment in stripping and would not normally be exposed to the plate.

☐ 12. Give flats to instructor for approval.

Note: Save flat for use in Unit 7, Job Sheet 5.

☐ 13. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________

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**Objective 20**

## Job Sheet 13—Strip Complementary Flats for Multi-Color Printing

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Main flat correctly stripped to expose all lines of type | ______ |
| • Lines marked for first and second colors | ______ |
| • Second masking sheet stripped to expose all lines in first color and labeled | ______ |
| • Third masking sheet stripped to expose all lines in second color and labeled | ______ |

**Basic Skills**

Reading

Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Light table
- T-square
- Stripping knife
- Tape dispenser with masking and lithographer's tape
- Line negative (image area appropriate for two-color printing)
- Three 10" x 15" masking sheets
- Black felt tip pen
- Opaque solution and opaque brush or opaquing pen

**Procedure**

☐ 1. Strip line negative to masking sheet.

☐ 2. Using stripping knife, cut away masking sheet exposing all lines of type on negative; opaque negative to eliminate imperfections.

☐ 3. Using black pen, mark which lines of type are to be printed in first and second colors.

☐ 4. Tape second masking sheet over stripped flat and cut away masking sheet to expose all lines to print in first color.

☐ 5. Identify masking sheet cut in step 4 as first color (name color).

☐ 6. Tape third masking sheet to first flat and cut away masking sheet to expose all lines of second color.

☐ 7. Identify third masking sheet cut in step 6 as second color (name color).

☐ 8. Identify first flat as main flat.

Note: A color proof may be made using acetate overlay proofing material. Burn the first color by placing the first mask over the main flat. Burn the second color by placing the second mask over the main flat.

☐ 9. Turn in main and complementary flats to instructor for evaluation.

Note: Save flats for use in Unit 7, Job Sheet 6.

☐ 10. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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**Objective 21**

## Job Sheet 14—Lay Out Signature Flats for a 16-Page Signature

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Imposition guide correctly folded and numbered | ______ |
| • Masking sheets correctly marked | ______ |

**Basic Skills**

Reading

Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

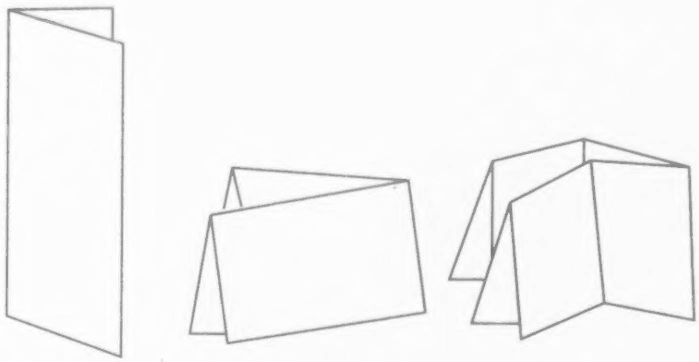
**Tools, equipment, and materials**

- Light table
- T-square
- Stripping knife
- Tape dispenser with clear tape and lithographer's tape
- Blank sheet of paper, size 11″ x 17″
- Two 11″ x 17″ masking sheets
- Black felt tip pen

**Procedure**

☐ 1. Fold the 11″ x 17″ sheet in half vertically, then into a quarter fold horizontally, and finally in half one more time (Figure 1).

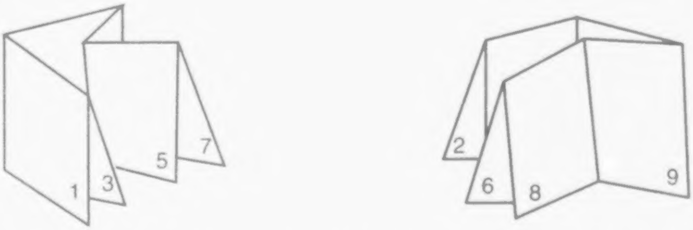
Figure 1



First fold Second fold Third fold

☐ 2. Holding folded edges at the left and top, number the bottom of sheets from 1 through 16 (Figure 2).

Figure 2



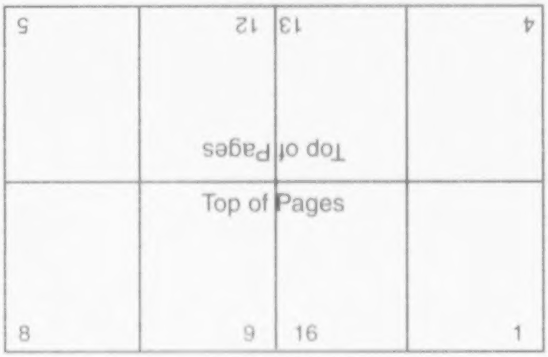
☐ 3. Unfold the marked sheet, now called an imposition guide.

Note: Be sure to have instructor show you how to identify the gripper edge and side guide as it relates to a particular press and folding machine.

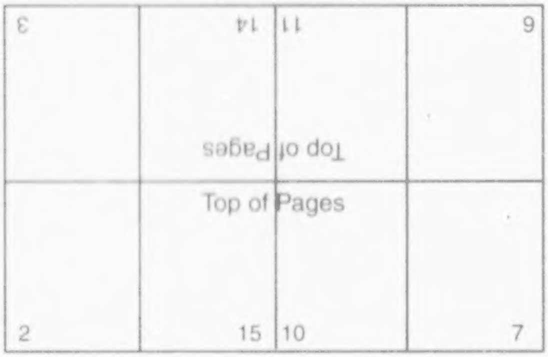
☐ 4. Mark the two masking sheets using the imposition guide (Figure 3).

Figure 3

Front of Sheet


5
12
13
4
Top of Pages
Top of Pages
8
9
16
1

Back of Sheet


3
14
11
6
Top of Pages
Top of Pages
2
15
10
7

☐ 5. Give the imposition guide and marked sheet to the instructor for evaluation.

☐ 6. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ________________________________

______________________________________________________

______________________________________________________

**Objective 22**

## Job Sheet 15—Strip a Two-Color Job Using Pin Register and Masking Film

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Masking sheet and amberlith/rubylith correctly punched | ______ |
| • Negative correctly stripped to masking sheet | ______ |
| • Amberlith/rubylith accurately registered and cut away for two colors | ______ |

**Basic Skills**

Reading

Critical Thinking

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Register punch
- Two register pins
- Masking sheet
- Stripping knife
- Negative for two-color job
- Light table
- Opaquing solutions and brush
- Amberlith or rubylith (two sheets same size as masking sheet)
- Tape dispenser with masking tape and red lithographer's tape

**Procedure**

☐ 1. Using register punch, punch masking sheet and amberlith/rubylith on the gripper edge.

☐ 2. Place masking sheet on light table and strip negative into position.

☐ 3. Fit register pins into holes punched in masking sheet.

☐ 4. Tape tabs of register pins to glass top of light table using masking tape.

☐ 5. Using the stripping knife, open up the mask over the image area.

☐ 6. Position register punched amberlith/rubylith masking film on pins.

☐ 7. Using stripping knife, cut outline of area to be printed in the primary color, cutting through peelable membrane only.

☐ 8. Peel away the colored film from the image area to be printed in the primary color.

☐ 9. Remove masking film from pins.

☐ 10. Get second piece of masking film and repeat steps 6 through 9.

☐ 11. Give stripped flat and two-color break masks to instructor for evaluation.

☐ 12. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________________________

______________________________________________

**Objective 23**

## Job Sheet 16—Determine Daylight Copy Proofing Exposure Using a Step-Off Test

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Flat aligned properly on daylight copy proofing material | ______ |
| • Gray scale properly masked | ______ |
| • Proofing materials properly exposed based on manufacturer's recommendations | ______ |
| • Proofing material developed, rinsed, and dried | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Contact frame
- Continuous tone 12- or 21-step transparent gray scale
- Stripping knife
- Two 10″ x 12″ masking sheets
- Red lithographer's tape
- Light table
- Darkroom developing trays with developer, fix, and water
- 10″ x 12″ piece of daylight copy proofing material

**Procedure**

☐ 1. With the aid of a light table and stripping knife, cut out gray scale size section of mask slightly back from leading edge of one masking sheet.

☐ 2. Position gray scale in cut out section of masking sheet and attach on both ends using small pieces of red lithographer's tape.

☐ 3. Position flat on daylight copy proofing material in vacuum frame of contact frame with the daylight copy proofing material emulsion side up and the emulsion of the gray scale facing down in contact with the daylight copy proofing material.

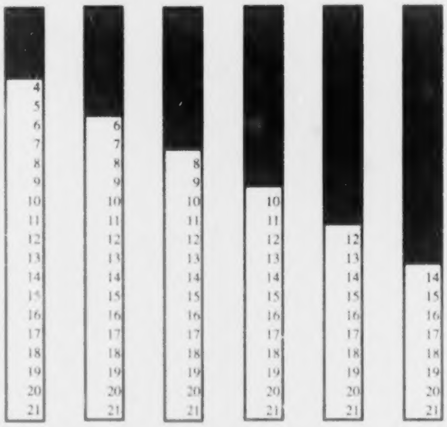
☐ 4. Close vacuum frame, lock and turn on vacuum.

☐ 5. Check vacuum pressure.

Note: When vacuum pressure is at a sufficient level, daylight copy proofing material is ready for the first exposure. Ask your instructor to explain the concept of Newton's Rings to determine vacuum pressure.

☐ 6. Make a step-off exposure (Figure 1).

Figure 1—Exposed gray scale


4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
8 9 10 11 12 13 14 15 16 17 18 19 20 21
10 11 12 13 14 15 16 17 18 19 20 21
12 13 14 15 16 17 18 19 20 21
14 15 16 17 18 19 20 21

Courtesy of Stouffer Graphic Arts Equipment Company.

☐ a. Make first exposure of 10 seconds.

☐ b. Release vacuum, move flat down about 1″ and cover up uncovered area of the daylight copy proofing material with second masking sheet.

☐ c. Make second exposure of 20 seconds.

☐ d. Repeat step b.

☐ e. Make third exposure for 30 seconds.

☐ f. Repeat step b.

☐ g. Make fourth exposure for 40 seconds.

☐ h. Repeat step b.

☐ i. Make fifth exposure for 50 seconds.

☐ j. Repeat step b.

- ☐ k. Make sixth exposure for 60 seconds.
- ☐ l. Repeat step b.

☐ 7. Process daylight copy proofing material in darkroom with developer, fix, and rinsing water.

Note: Follow manufacturer's directions for processing times and temperatures.

☐ 8. Check copy proofing manufacturer's recommendations for correct step-on gray scale. Making a 6-step step-off test as previously described will usually yield an exposure that will provide the recommended step on the gray scale. If not, the test may simply be redone using different exposure numbers.

☐ 9. Give daylight copy proofing proof to instructor for evaluation.

☐ 10. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________

______________________________

**Objective 24**

## Job Sheet 17—Expose a Blueline or Daylight Copy Proof

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Exposure correctly made | ______ |
| • Proof image accurately registered | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Introduction**

This exercise will familiarize the student with the procedures of exposing a blueline or daylight copy proof in shops where such proofs are used.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Vacuum printer
- Register pins
- Register punch
- Blueline or daylight copy proofing material
  Note: Some blueline proofing materials require the use of an exposing filter for obtaining a high quality blue image. The purpose of the filter is to help balance the exposing light source to the emulsion sensitivity of the product.
- Stripped flats for a combination print

**Procedure**

☐ 1. Obtain necessary stripped flats for making a combination print.

☐ 2. Obtain appropriate piece of blueline or daylight copy proofing material.

☐ 3. Punch proofing material and position on pins.

☐ 4. Register first flat on the pins for exposure to the proofing material.

☐ 5. Make exposure (check with instructor).

☐ 6. Remove primary flat from pins and place secondary flat on pins.

☐ 7. Make exposure.

☐ 8. Remove secondary flat.

☐ 9. Check proof for image registration.

Note: If using daylight copy proofing material, develop in darkroom using developer and fix. Rinse in running water for five minutes.

☐ 10. Give flats and exposed proof to instructor for evaluation.

☐ 11. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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## Unit Contents

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## Objective Sheet

**Unit Objective**

After completing this unit, the student should be able to determine the correct plate exposure and make required plates for single and multiple color jobs when using line negatives and/or screens and halftones. The student should demonstrate these competencies by completing the job sheets and by scoring a minimum of 85 percent on the written test.

**Specific Objectives**

After completing this unit, the student should be able to:

1. Match terms related to platemaking procedures with their definitions.
2. Identify types of plate ends.
3. Match types of offset plates with their characteristics.
4. Identify plate exposing devices.
5. Match types of presensitized plates with their characteristics.
6. Select true statements concerning the gumming of plates.
7. Select true statements concerning handling and storing plates.
8. Select true statements related to the do's and don'ts for properly handling plates and chemicals.
9. Expose and develop a subtractive plate. (Job Sheet 1)
10. Determine plate exposure using a step-off test. (Job Sheet 2)
11. Expose a step-and-repeat plate. (Job Sheet 3)
12. Make a step-and-repeat plate using pin register system. (Job Sheet 4)
13. Expose a plate when using a screen tint. (Job Sheet 5)
14. Make plates for a two-color job. (Job Sheet 6)
15. Expose a photodirect plate. (Job Sheet 7)

## Information Sheet

Objective 1

### Terms and definitions

a. **AGE (asphaltum gum etch)**—Protective gum storage chemical typically used on plates that need to be stored for a long period of time

b. **Blind**—An imaged plate surface that will not accept ink

c. **Broken image**—An incomplete image on the plate

d. **Deep-etch plate**—A plate in which the image is etched slightly below the surface; exposed from a flat composed of film positives

e. **Deletion fluid**—A solution used to eliminate plate flaws or unwanted image areas

f. **Dot**—The individual element of a halftone

g. **Dot loss**—Disappearance of a dot from the plate

h. **Dot spread**—Dot enlargement on the plate

Note: This is commonly referred to as dot gain.

i. **Grained plate**—A plate where tiny pits or indentations in the surface of the plate allow it to carry water

j. **Gray scale (sensitivity guide)**—A commercially-produced sensitivity guide with a 12-step negative representing the various tones from white to black; used by platemakers to determine plate exposure

k. **Gum arabic**—Solution used to preserve plate and protect surface from oxidation

Note: Many plate manufacturers use a finisher/desensitizer in lieu of gum arabic.

l. **Halo**—A shadow around the edge of a halftone created by improper stripping or platemaking procedures

m. **Hone**—An abrasive stone used to remove unwanted marks on the plate surface

n. **Image-add pen**—A fiber-tip pen used to repair broken images on the plate surface

o. **Ink-receptive**—Areas on plate which accept and hold ink and reject water

p. **Ink-repellent**—Areas on plate which accept and hold water and reject ink

q. **Lacquer**—Solution used for hardening the image area of an additive plate

r. **Light-sensitive coating**—Diazo compound or photopolymer which, after exposing and processing, creates image area on plate

s. **Process gum/desensitizer**—A solution used to desensitize an additive plate

Note: Manufacturers have different processes. Use recommended chemistry with plate.

t. **Smooth plate**—A plate whose surface is grainless

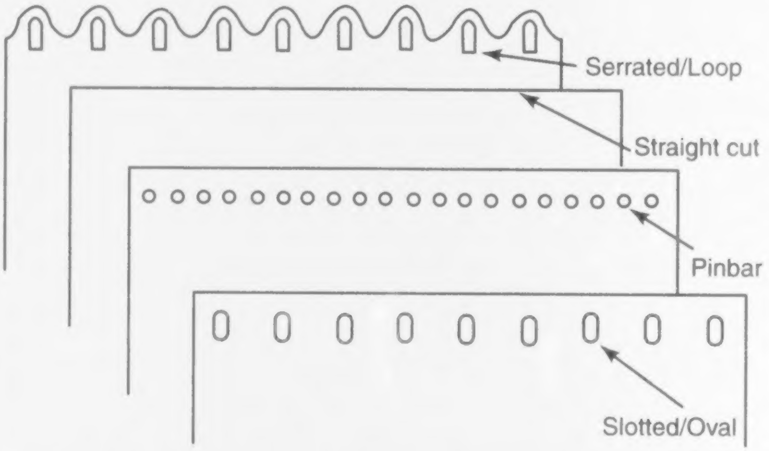
u. **Squeegee**—A smooth rubber blade used to wipe moisture from plate surface

v. **Surface plate**—A plate in which the image and nonimage areas are level; may be exposed from either a negative or positive film flat depending on plate coating

Objective 2

### Types of plate ends

Figure 1



Objective 3

### Types of offset plates and their characteristics

a. Surface

- Presensitized—Light-sensitive coating is applied during plate manufacturing.
- Photodirect—Made directly in automatic platemakers making intermediate step (flat) unnecessary.

  Note: These commonly come in roll form.
- Wipe-on—Light-sensitive coating is applied in shop immediately before exposure.

- Electrostatic—Image is produced on plate surface by an electrostatic charge.
- Direct-image—Has no sensitized coating; image is accomplished by typing or hand lettering.

Note: The direct-image plates are often called *masters*.

b. Deep-etch—Image area chemically etched to a depth slightly below nonprinting area; common types are single metal and multimetal.

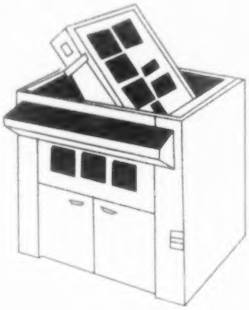
Objective 4

**Plate exposing devices**

a. Vacuum frame—Holds flat and plate in close contact

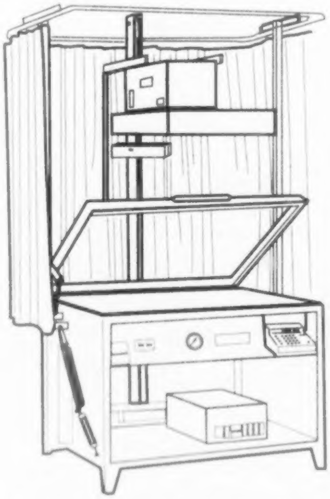
- Flip-top exposing unit

Figure 2



- Overhead exposing unit

Figure 3

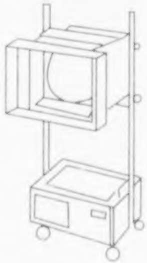


Courtesy of The Douthitt Corporation.

- Stand-alone exposing unit

  Note: Stand-alone exposing units are used with stand-alone vacuum printer for exceptionally large offset plates.

  Figure 4

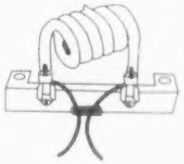


Courtesy of Burgess Industries, Inc., Plymouth, Minnesota.

b. Light sources

- Pulsed-xenon light (helical type)

  Figure 5

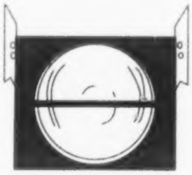


Courtesy of Burgess Industries, Inc., Plymouth, Minnesota.

- Carbon-arc light

  Note: Carbon arc is the oldest and least used of the available light sources. It is found only in flip-top and stand-alone units. The other two light sources may be found in any of the three types of exposure units.

  Figure 6



- Mercury vapor or metal halide lamp

Figure 7

Courtesy of Burgess Industries, Inc., Plymouth, Minnesota.

Objective 5

## Types of presensitized plates and their characteristics

a. Additive-working—A special ink-holding coating is added during plate developing process

b. Subtractive-working—Have a factory applied synthetic lacquer coating which is removed during development

c. Negative-working—Produce an image area in all places on the plate that are struck by light during exposure

d. Positive-working—Produce an image area in all places on the plate not struck by light during exposure

Objective 6

## Gumming of plates

a. After applying gum arabic or other recommended finisher to plate, the surface should be buffed totally dry with sponge or cotton pad.

b. Both sides of plate should be buffed totally dry before hanging up.

c. Hang up plates in such a way that one plate does not lie against another.

d. If plate has been run, clean both sides before gumming.

e. AGE should be used to gum plates for long-term storage.

Objective 7

## Handling and storing plates

a. Handling

- Pick up plates at ends using only thumb and index finger.

**Caution:** Avoid sliding fingers along plate edges as they are sharp.

- Avoid touching plate surfaces with fingers before and after processing.
- Lift plates by opposite corners to avoid crimping or scratching.

b. Storing

- Be certain all plates are clean and dry before storing.
- Store plates in vertical hanging envelopes if possible.
- Protect plates stored in flat drawers with folders.
- Store unexposed presensitized plates in cool, dry area away from light and do not remove until ready for exposure.

Objective 8

**Do's and don'ts for properly handling plates and chemicals**

a. **Do** handle sharp-edged plates carefully.

b. **Do** raise, rotate, and close vacuum frame slowly and carefully.

c. **Do** shake chemicals well before using.

d. **Do** pour chemicals slowly.

e. **Do** store chemicals in properly marked, tightly closed containers.

f. **Do** read and use recommended HMIS handling procedures when using plate processing chemicals.

g. **Do not** handle electrical platemaking equipment with wet hands.

h. **Do not** lean on glass-topped vacuum frame.

i. **Do not** breathe chemical fumes.

j. **Do not** look directly at light sources.

**Caution:** Do not wear contact lenses when working in carbon arc platemaking area.

**Objective 9**

## Job Sheet 1—Expose and Develop a Subtractive Plate

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Plate properly exposed based on manufacturer's recommendations | ______ |
| • Plate correctly developed, rinsed, gummed, and buffed dry to provide an ink receptive image area and a water receptive nonimage area | ______ |

**Basic Skills**

Reading · Critical Thinking · Employability · Technology

**Introduction**

This exercise will familiarize the student with the procedures of exposing a plate and using necessary equipment and chemicals to develop the plate.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Plate exposure device
- Glass cleaner and wipes
- Presensitized subtractive plate (negative-acting)
- Plate developing sink or table
- Plate processing chemicals
  Note: Plate processing chemicals usually consist of a developer and a finisher for subtractive plates; be sure to follow manufacturer's recommendations for use.
- Sponge or pad applicator for developer
- Squeegee
- Sponge or cotton litho pads for finisher
- Cotton pads for buffing plate dry
- Paper pad
  Note: Pad should be slightly larger than largest plate size used. Sheets of newsprint work nicely for making pads.

**Procedure**

Note: All plate handling including exposing and processing should be done in a yellow light environment if possible to avoid excessive exposure to UV light.

☐ 1. Clean sink area. Arrange chemicals and other materials in an orderly fashion to facilitate plate processing procedure.

☐ 2. Check developing pad applicator to be sure it is clean and free of excessive moisture.

☐ 3. Clean glass on vacuum printer.

☐ 4. Make plate exposure.

☐ 5. Place plate in developing sink and pour a liberal amount of developer over plate surface.

☐ 6. Use developer applicator to spread chemical over plate surface.

☐ 7. Allow chemical to set for 10 to 15 seconds.

Note: This dissolves the unexposed coating.

☐ 8. Finish developing plate using pad applicator in a figure-8 motion, being sure to cover entire surface area of plate.

☐ 9. Check any screens and halftones closely to assure they are properly cleaned out.

☐ 10. Flush plate with water to remove excess developer and dissolved light-sensitive coating.

☐ 11. Squeegee excess moisture from plate surface and place plate on a pad of absorbent paper.

☐ 12. Apply a thin uniform coating of finisher/desensitizer to the plate surface using vertical and horizontal strokes.

Note: This final protective coating should be rubbed into the plate surface for 15 to 20 seconds for each square foot of plate surface area.

☐ 13. Buff both sides of plate totally dry.

☐ 14. Give finished plate to instructor for evaluation.

☐ 15. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________________________

______________________________________________

**Objective 10**

## Job Sheet 2—Determine Plate Exposure Using a Step-Off Test

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Flat aligned properly on offset plate | _____ |
| • Gray scale properly masked | _____ |
| • Plate properly exposed based on manufacturer's recommendations | _____ |
| • Plate correctly developed, rinsed, gummed, and buffed dry to provided an ink receptive image area and a water receptive nonimage area | _____ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Introduction**

This exercise will familiarize the student with the procedures of exposing a plate according to a gray scale comparison and using necessary equipment and chemical to develop the plate.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- 10″ x 15″ masking sheet
- Platemaker's continuous tone 12- or 21-step transparent gray scale
- Stripping knife
- Red lithographer's tape
- Light table
- Plate exposing and processing equipment (Refer to Job Sheet 1.)

**Procedure**

☐ 1. With the aid of a light table and stripping knife, cut out gray scale size section of mask slightly back from leading edge of masking sheet.

☐ 2. Position gray scale in cut out section of masking sheet and attach on both ends using small pieces of red lithographer's tape.

☐ 3. Position flat offset plate in vacuum frame of platemaker with the plate emulsion facing up and the emulsion side of the gray scale facing down in contact with the plate.

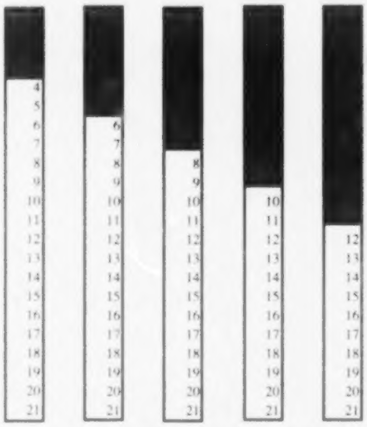
☐ 4. Close vacuum frame, lock, and turn on vacuum.

☐ 5. Check vacuum pressure.

Note: When vacuum pressure is at a sufficient level, plate is ready for the first exposure. Ask your instructor to explain the concept of Newton's Rings to determine vacuum pressure.

☐ 6. Make a step-off exposure (Figure 1).

Figure 1—Exposed gray scale


4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
8 9 10 11 12 13 14 15 16 17 18 19 20 21
10 11 12 13 14 15 16 17 18 19 20 21
12 13 14 15 16 17 18 19 20 21

Courtesy Stouffer Graphic Arts Equipment Company

- ☐ a. Make first exposure of 15 seconds.
- ☐ b. Release vacuum, move flat down about 1 inch and cover up uncovered area of the plate with another masking sheet.
- ☐ c. Make second exposure of 30 seconds.
- ☐ d. Repeat step b.
- ☐ e. Make third exposure for 45 seconds.
- ☐ f. Repeat step b.
- ☐ g. Make fourth exposure for 60 seconds.
- ☐ h. Repeat step b.
- ☐ i. Make fifth exposure at 90 seconds.

☐ 7. Process plate. (See Job Sheet 1.)

Note: Check plate manufacturer's recommendations for correct step on gray scale. Making a 5-step step-off test as previously described will usually yield an exposure that will provide the recommended step on the gray scale. If not, the test may simply be redone using different exposure numbers.

☐ 8. Give plate to instructor for evaluation.

☐ 9. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________________________

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**Objective 11**

## Job Sheet 3—Expose a Step-and-Repeat Plate

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Flat aligned properly on offset plate | ______ |
| • Plate properly exposed; notches in register | ______ |
| • Plate correctly developed, rinsed, gummed, and buffed dry to provide an ink receptive image area and a water receptive nonimage area | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Introduction**

This exercise will familiarize the student with the procedures of exposing a step-and-repeat plate and using necessary equipment and chemicals to develop the plate.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Flat stripped for step-and-repeat
  Note: Use flat prepared for Unit 6, Job Sheet 7.
- 10″ x 15″ masking sheets
- Plate exposure device
- Glass cleaner and wipes
- Presensitized subtractive plate (negative-acting)
- Plate developing sink or table
- Plate processing chemicals
- Sponge or pad applicator for developer
- Squeegee
- Sponge or cotton litho pads for finisher
- Cotton pads
- Paper pad

**Procedure**

Note: Although this procedure is valid, and used by many shops, other shops strip multiple negatives on a common flat, avoiding the need for multiple plate burns.

☐ 1. Position flat on presensitized plate.

☐ 2. Make first exposure (burn).

☐ 3. Reposition flat for second exposure (burn) by matching first notch on flat with exposure mark on plate left by second notch.

☐ 4. Place masking sheet over exposed portion of plate.

☐ 5. Make second exposure.

☐ 6. Repeat procedure until number of desired images are exposed on plate.

Note: Make certain edge of plate and flat are aligned perfectly for each exposure. Place an additional masking sheet over exposed part of the plate for each additional exposure.

☐ 7. Develop plate.

☐ 8. Rinse plate and squeegee off excess moisture.

☐ 9. Place processed plate on pad of absorbent paper.

☐ 10. Apply finisher/desensitizer (gum).

☐ 11. Buff plate dry on both sides.

☐ 12. Give plate to instructor for evaluation.

☐ 13. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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**Objective 12**

## Job Sheet 4—Make a Step-and-Repeat Plate Using Pin Register System

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Flat aligned properly on offset plate using pin register | ______ |
| • Multiple exposures are in register | ______ |
| • Plate correctly developed, rinsed, gummed, and buffed dry | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Introduction**

This exercise will familiarize the student with the procedures involved in exposing a plate that must remain in register and using necessary equipment and chemicals to develop and correct the plate.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Step-and-repeat template and image carrier flats
  Note: Use flats prepared for Unit 6, Job Sheet 10.
- 10″ x 15″ offset plate
- Vacuum exposing unit
- Contact register pins
- Processing chemicals and supplies (See Job Sheet 1.)
- Blank 12″ x 18″ masking sheet

**Procedure**

☐ 1. Place the template (label up) into the plate-exposing unit (vacuum frame).

☐ 2. Position plate on template and tape corners with masking tape.

Note: When taping, do not cover any of the pin-register fitters.

☐ 3. Insert contact register pins into the two fitters for the bottom stepping position.

Note: The maximum height of your pins should be no higher than 0.070″ for use in the vacuum frame. Higher pins often cause image distortion.

☐ 4. Place the negative carrier (film emulsion side down) over the register pins on the template.

☐ 5. Mask off the unprotected areas of the plate with a blank masking sheet.

☐ 6. Make plate exposure. (See Job Sheet 1.)

☐ 7. For the second exposure, move the register pins and the negative-carrier to the middle stepping position of the template.

☐ 8. Mask off the unprotected areas of the plate with a blank masking sheet.

☐ 9. Make plate exposure.

☐ 10. For the third (final) exposure, move the pins and negative-carrier to the top stepping position of the template.

☐ 11. Mask off the unprotected areas of the plate with a blank masking sheet.

☐ 12. Make plate exposure.

☐ 13. Remove plate from template and develop, process, gum, and dry. (See Job Sheet 1.)

☐ 14. Give plate to instructor for evaluation.

☐ 15. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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**Objective 13**

## Job Sheet 5—Expose a Plate When Using a Screen Tint

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Screen properly stripped in | ______ |
| • Flat aligned properly on offset plate | ______ |
| • Plate properly exposed | ______ |
| • Plate correctly developed, rinsed, gummed, and buffed dry | ______ |
| • Screen tint dots properly developed and cleaned to avoid plugging | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Introduction**

This exercise will familiarize the student with the procedures of exposing a plate using a screen tint and using necessary equipment and chemicals to develop the plate.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Flat acceptable for screening portion of image (See your instructor.)
- Light table
- Screen tint (line ruling and percentage optional)
- Red lithographer's tape
- Scissors
- Offset plate
- Processing chemicals and supplies
- Vacuum exposing unit

**Procedure**

☐ 1. Lay flat on light table emulsion side up.

☐ 2. Identify area to be screened.

☐ 3. Use scissors to cut a piece of screen tint 1/4" larger on all four sides than area to be screened.

☐ 4. Tape screen (emulsion side up) over image area making sure of total coverage with overlap on all sides.

Note: Using litho tape, attach screen to negative on two sides, keeping tape as far away from image as possible to avoid the possibility of halation.

☐ 5. Position plate in vacuum exposing unit and position flat on plate with image right reading and the emulsion of the screen tint in direct contact with the plate surface.

☐ 6. Close vacuum frame and expose plate.

☐ 7. Process plate. (See Job Sheet 1.)

☐ 8. Check screen to see that it is properly cleaned out.

☐ 9. Give plate to instructor for evaluation.

☐ 10. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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**Objective 14**

## Job Sheet 6—Make Plates for a Two-Color Job

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Register holes properly punched | ______ |
| • Flat aligned properly on offset plate | ______ |
| • Multiple flats are in register | ______ |
| • Corrections made on offset plate with deletion pen | ______ |
| • Plate correctly developed, rinsed, gummed, and buffed dry | ______ |

**Basic Skills**

Reading Critical Thinking Employability Technology

**Introduction**

This exercise will familiarize the student with the procedures of exposing a plate that must remain in register and using necessary equipment and chemicals to develop and correct the plate.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Flats stripped for two-color job
  Note: Use flats prepared for Unit 6, Job Sheet 13.
- Vacuum exposing unit
- Two offset plates
- Contact register pins
- Processing chemicals and supplies (See Job Sheet 1.)
  Note: If available, pin register system may be used to register main flat with color break masks and offset plates.
- Image deletion pen

**Procedure**

☐ 1. Punch masking sheets with register punch (if not already punched).

☐ 2. Punch plates.

☐ 3. Position main flat on the first plate using contact register pins.

☐ 4. Register first color flat over main flat on contact register pins.

☐ 5. Close vacuum frame and make first plate exposure.

☐ 6. Position main flat on the second plate on contact register pins.

☐ 7. Register second color flat over main flat on contact register pins.

☐ 8. Close vacuum frame and make second plate exposure.

☐ 9. Process plates. (See Job Sheet 1.)

☐ 10. Use image deletion pen to make any corrections to offset plate.

☐ 11. Gum plate after making deletion.

☐ 12. Present plates to instructor for evaluation.

☐ 13. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

______________________________

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**Objective 15**

## Job Sheet 7—Expose a Photodirect Plate

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Copy positioned properly to maintain squareness of image | ______ |
| • Plate correctly exposed containing entire image, good contrast, and no flaws, scratches, or spots | ______ |

**Basic Skills**

Reading
Critical Thinking
Employability
Technology

**Introduction**

This exercise will familiarize the student with the procedures of exposing a photodirect plate, a process used in many shops.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Photodirect platemaker
- Photo-mechanical copy (paste-up or original)
- Glass cleaner
- Paper towel

**Procedure**

☐ 1. Clean copy frame glass.

☐ 2. Position photo-mechanical copy (paste-up or original) in copy frame.

☐ 3. Set percentage (100%) on copy frame.

☐ 4. Set percentage (100%) on control panel.

☐ 5. Set plate length (13–14″).

☐ 6. Set exposure dial S x 10 and 1.5 = 15 seconds.

Note: Assume this is the normal exposure.

☐ 7. Press exposure button.

☐ 8. When plate comes out (approximately 90 seconds) check to make sure entire image is on plate.

Note: Compare plate with original copy.

☐ 9. Check contrast between image and background.

☐ 10. Check for flaws, scratches, and spots.

☐ 11. Correct exposure.

   a. If copy and background are dark, lengthen exposure by 2 seconds.

   b. If copy is light, shorten exposure by 2 seconds.

☐ 12. Turn in final plate to instructor for evaluation.

☐ 13. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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## Unit Contents

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## Objective Sheet

**Unit Objective**

After completing this unit, the student should be able to explain the differences in the flow of prepress activity in a computer-to-plate, or a computer-to-press operation, and address the fundamental changes in staffing needs and operating procedures taking place because of this technology. The student should demonstrate these competencies by completing the assignment sheets and job sheet and by scoring a minimum of 85 percent on the written test.

**Specific Objectives**

After completing this unit, the student should be able to:

1. Match terms related to digital printing with their definitions.
2. Select types of digital printing systems.
3. Complete statements concerning the types of computer-to-plate printing systems.
4. Explain unique capability of computer-to-print systems.
5. List three technologies using computer-to-print engineering.
6. Compare and contrast a traditional printing operation to a digital printing operation.
7. Collect current event material relating to digital printing. (Assignment Sheet 1)
8. Compare and contrast the changes in staffing and training needs in a shop adopting CTP technology. (Assignment Sheet 2)
9. Analyze effects of digital printing on the printer's and customer's view of cost, service, and competitiveness. (Assignment Sheet 3)
10. Create a camera-ready laser copy of a page containing text and graphics. (Job Sheet 1)

## Information Sheet

Objective 1

### Terms and definitions

a. **Computer-to-metal-plate (CTMP)**—High-end systems which use digital information to create a metal plate directly, without the use of intermediate films; produces high quality output; generally only used in large printing facilities

b. **CTP**—Computer-to-plate or computer-to-print; technology which allows the operator of a desktop publishing terminal to output a digitized document directly to a platemaker, press, or other printing device

c. **Desktop publishing (DTP)**—Using a personal computer, appropriate software, and an output device to combine text and graphics to produce a document

d. **Digital camera**—A filmless photographic device that is used to capture an image on electronic media that can be downloaded to a computer for manipulation and storage

e. **Digital imaging**—The product of imagesetting equipment in fully composed pages

f. **Digital printing**—A system using a number of computer and electronic technologies to integrate color separation, correction, retouching, page makeup, text editing, and imposition—without the use of intermediate film steps

g. **Direct imaging**—The use of digitized files to drive equipment which produces reproductions directly on the substrate without the need for intermediate films or plates

h. **Imagesetter**—A machine combining the functions of a printer, recorder, and RIP which is capable of outputting a fully composed page to a platemaker, press, or other printing device

i. **RIP**—Raster image processor; a device which encodes a computer's page description language into bitmaps (or graphics cues) used by an imagesetting machine

j. **Trapping**—(In prepress) The degree to which overprinting colors overlap to eliminate white lines between colors in printing

**Objective 2**

**Types of digital printing systems**

a. Computer-to-plate—Systems which use digital information to create a plate directly, without the use of intermediate films

b. Computer-to-print or computer-to-press—Systems which use digital information to control electro-photographic, ionographic, magnetographic, ink-jet, or thermal transfer imaging to produce reproductions directly, without the use of intermediate films or plates

**Objective 3**

**Computer-to-plate printing systems**

a. Plates or image carriers for gravure and flexography on which images can be produced by etching the surface with lasers or electromechanical engraving devices

b. High-speed light-sensitive plates for lithography coated with emulsion to be exposed by low-power visible lasers

c. Non-light-sensitive plates for lithography coated with emulsion on which images can be exposed by heat rather than light

**Objective 4**

**Computer-to-print capability**—Computer-to-print systems are derivatives of electrostatic copying machines in which the image recorded must be repeated for each impression. Because of this, these systems are capable of printing variable information from impression to impression—depending upon digital information stored in the driving computer. All go directly from an imagesetter to a press-like device without intermediate films or plates.

**Objective 5**

**Technology using computer-to-print systems**

Note: Although computer-to-print systems are designed specifically for so-called "short run" jobs, such systems are increasingly useful for publishing materials that are tailored specifically to individual readers and advertisers in press runs of 100,000 or fewer.

a. Electronic printers

b. Color copiers

c. Electronic printing systems

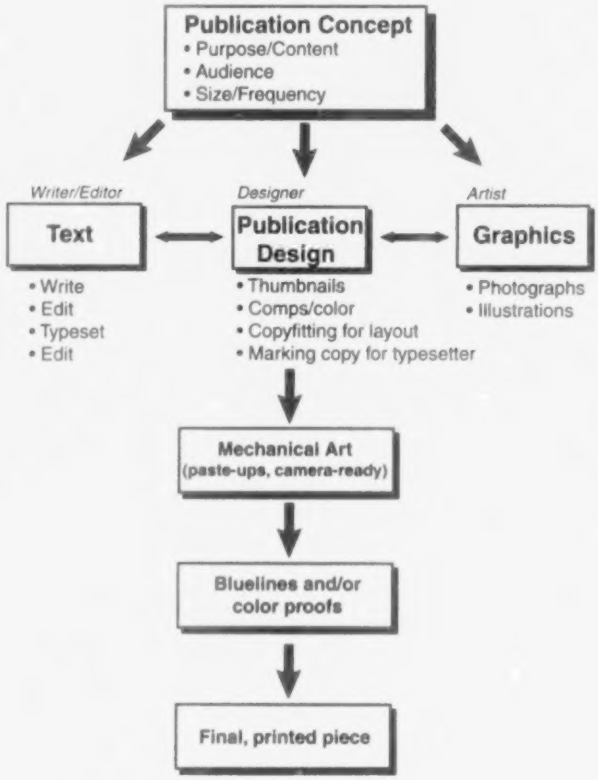
Objective 6

## Traditional printing vs. digital printing

a. Traditional printing

- Publication concept—Purpose/content, audience, size/frequency
- Text—Write, edit, typeset, edit
- Publication design—Thumbnails, comps/color, copyfitting for layout, marking copy for typesetter
- Graphics—Photographs, illustrations
- Mechanical art—Paste-ups of text and graphics, camera ready
- Bluelines and/or color proofs
- Final, printed piece

Figure 1—Overview of traditional printing


Publication Concept
• Purpose/Content
• Audience
• Size/Frequency
Writer/Editor
Text
• Write
• Edit
• Typeset
• Edit
Designer
Publication Design
• Thumbnails
• Comps/color
• Copyfitting for layout
• Marking copy for typesetter
Artist
Graphics
• Photographs
• Illustrations
Mechanical Art
(paste-ups, camera-ready)
Bluelines and/or color proofs
Final, printed piece

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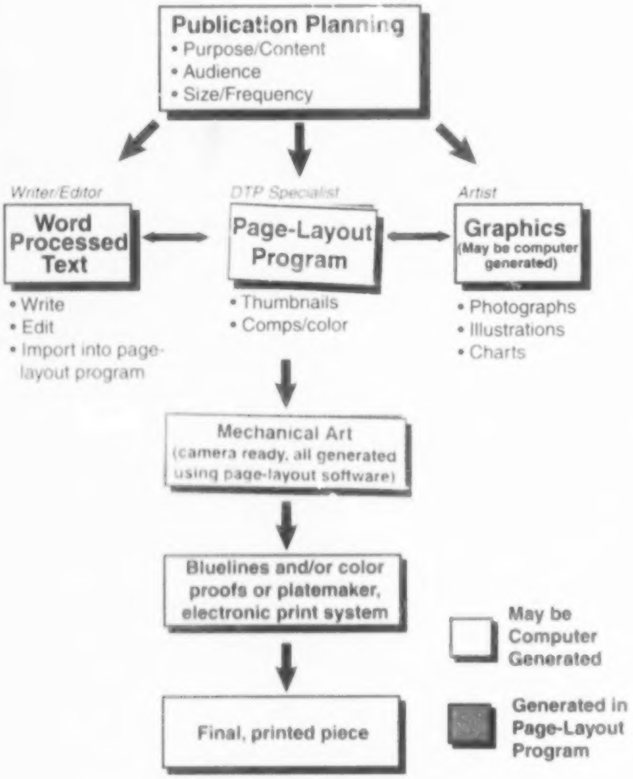
b. Digital printing

- Publication concept—Purpose/content, audience, size/frequency
- Word-processed text—Write, edit, import into page-layout program
- Page-layout program—Thumbnails, comps/color
- Graphics—(May be computer generated) Photographs, illustrations, charts, imported into page-layout program
- Mechanical art—Camera ready, all generated using page-layout program
- Bluelines and/or color proofs
- Final, printed piece

Figure 2—Overview of digital printing


Publication Planning
• Purpose/Content
• Audience
• Size/Frequency
Writer/Editor
Word Processed Text
• Write
• Edit
• Import into page-layout program
DTP Specialist
Page-Layout Program
• Thumbnails
• Comps/color
Artist
Graphics (May be computer generated)
• Photographs
• Illustrations
• Charts
Mechanical Art (camera ready, all generated using page-layout software)
Bluelines and/or color proofs or platemaker, electronic print system
Final, printed piece
May be Computer Generated
Generated in Page-Layout Program

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## Student Supplement 1—Overview of Digital History in Printing

Although the process of printing has undergone a steady technological evolution since it was introduced to the western world in the middle 1400s in the form of Gutenberg's movable type, the pace with which the process and industry is changing today is astounding.

From Gutenberg's time, printing remained a manual craft using hand-cast or cut letters, hand-set type, and hand-operated presses for roughly 350 years. By 1800 the Industrial Revolution had begun to bring changes to printing, and lithography and photography combined by 1840 to produce photoengraving. By 1893 three-color printing was practical and printing, as a process, remained relatively unchanged until the 1950s, with the introduction of electronics which led to computers, phototypesetting, and electronic scanners. In fact, had Gutenberg traveled forward in time to 1950, he would have been able to set type by hand from a typecase and pull a proof on a proof press—much the same way he would have 500 years earlier!

By 1980, however, digital image processing was being seen as a tool to eliminate most of the film and handwork involved in prepress activities. With steadily improving word-processing computer programs, personal computers, and laser printer technology, the staff of the printing industry's "back shop" was beginning to realize computers were capable of doing much of its work, with more precision and with less production cost. By 1993 digital imagesetting equipment capable of producing a ready-to-mount printing plate showed much of traditional prepress activity would soon become the domain of computer-driven machinery.

By 1997, photography was giving way to electronic imaging systems. What photography remains is controlled by densitometers, computers, and automatic processors. Nearly 95 percent of all color separations and corrections are done electronically on scanners, prepress and desktop publishing systems, and halftone output films are generated by lasers. Most stripping is done by computer-aided design (CAD) techniques. Color proofs are made from separation films made directly—without a press, and some are made directly from digital data in computers. Today more companies are filmless with digital bluelines and proofs and direct-to-plate.

Plates are processed automatically and some are made directly by lasers, electrical impulses, or spark discharge from digital data held in computers.

On the press, ink fountains are pre-set from digital data, or from data derived from scanning printing plates before they are mounted on the cylinder, and, in many cases, computers are used to monitor the press run and adjust the press accordingly throughout for color correction and quality control.

Although digital technology had been applied mainly to prepress activities up through the mid-1990s, future applications of computer-driven technology promise to revolutionize platemaking with filmless computer-to-plate and the printing process itself. Already many short-run (100,000 or fewer impressions) projects are being printed by computer controlled four-color copier presses driven by digital images created on desktop publishing equipment.

Despite tremendous change in the printing industry since 1950, those in the business should expect even more new technology and retraining over the next 20 years—as much or more, in fact, than occurred from Gutenberg's first movable type in the 1400s to 1950.

### Highlights of the Digital Printing World History

The most important changes have come since 1985 when Apple Corporation introduced the Apple Macintosh computer and the Apple LaserWriter printer combined with Adobe PostScript page description language and the Adobe PageMaker software. This combination developed into the plain-paper typesetter which replaced other typesetting systems using photographic output. This technology put "front end" capability within reach of every business or home with a personal computer. No longer was the printing industry responsible for the creation of blocks of type for printing jobs.

In 1988 the typesetter became the imagesetter. PostScript produced bitmapped images which could record illustrations as well as text and could be reproduced by raster image processors (RIPs). Desktop publishing was then capable of producing halftone films of fully composed pages for single-color, multi-color, or process-color reproductions that could be stripped out onto flats for making printing plates.

In 1991 Heidelberg introduced the GTO-DI, the first four-color offset digital printing process, which used Presstek Spark Discharge technology. Because plates required no wet processing, they could be imaged directly on the press, and printing could be done dry without the need for dampening. This press and the platemaking technology were developed specifically for short-run color printing. Although slow to develop because of poor quality spark discharge imaging and inadequate promotion, the GTO-DI was actually a computer-to-plate system.

New developments in 1993 totally changed the perspective on digital printing. Presstek introduced PEARL laser diode ablation imaging technology—replacing spark discharge—with much higher quality results. Also, Israel's Indigo announced the E-Print 1000 electrophotographic sheetfed digital offset color press. And, Xeikon Corp., Belgium, introduced the Xeikon DCP-1 8-unit electrophotographic web color press.

By the middle 1990s several firms were assembling systems to put digital printing within reach of small to medium size printers. A good example would be Xerox Corp., and its Docutech system based on Xerox's venerable 5090 black and white copier and/or Docu40 color copier.

## Student Supplement 2—Moving From Traditional Prepress to Electronic Prepress

How does electronic prepress technology affect a traditional print shop?

In order to stay up-to-date in today's competitive printing industry, traditional print shops are shifting to computerized prepress activities. Digitized equipment simplifies prepress procedures, but many times complicates the operation and adds to the frustration level of workers involved in prepress activities.

This frustration is generally manifested in employees who have had no previous computer experience. These employees have had to learn the new technology or face the prospect of losing their jobs. As print shops continue to make progress with the learning curve of computers, they are finding that computer programs can do automatically what it used to take hours to do manually.

Ten to fifteen years ago, a typical print shop would employ ten or more film strippers. Today, with the advent of computer technology three computer-educated employees can now do the same amount of work as ten film strippers.

Print shops face challenges with system errors, lack of thorough knowledge of various software, and software incompatibility as they work through the transition to digitized prepress capability.

Today, a typical print shop prepress department might contain Apple Macintosh G3 workstations, Windows workstations, Windows NT printing/file server, digital proofer, scanner, black and white laser printer, color printer, plotting devices, RIP, imagesetter, blueline/plate burners, and light tables. Industry standard graphic arts software might include, but is not limited to, Adobe Photoshop, Adobe PageMaker, Adobe Illustrator, QuarkXPress, pagination software, and utility programs.

### Then

In a traditional production workflow the following steps were taken by a staff of nine to produce a curriculum manual.

- First, each page had to be checked visually for inconsistencies.
- Then, dummies were created for the imposition guide.
- Next, the job was sent to be pasted up as four-page flats which enabled the prepress staff to shoot the flat on a 20 x 24 inch piece of film.
- Once the film was developed and punched, it had to be cut apart into individual pages. The film was then placed in numerical order to match the imposition guide.
- From there, the film was stripped by means of placing it on unique stripping boards and taping it to acetate carriers.

- The next step was to place the eight-page flat on the light table to check for quality, opaque imperfections, and pinholes.

- If the job had photographs, a densitometer was used to take the highlight and shadow readings. Each photo had to be shot on film individually to maintain quality and then each had to be stripped into the flat or doubleburned with the flat.

- The final step before plating was to produce blueline proofs which had to be folded, stitched, and sent back to the customer for approval.

### Now

In an electronic prepress production workflow the following steps are now taken by a staff of five to produce a curriculum manual.

- Today, prepress departments can receive digitized job files on a variety of removable media such as floppy disks, Zip disks, Jaz disks, and CDs. Files can also be received via a modem through the internet. On digitized files, the halftones are already scanned in and linked to the job file. The process camera and art boards have been replaced with removable media and electronic files.

- The file is "opened" (called to the screen of a prepress computer) and checked for inconsistencies using a preflight program such as Markzware Flightcheck. Photo imaging software such as Adobe Photoshop is used to check halftones and adjust the highlights or shadows directly on the screen. The corrected file is then resaved and relinked to be utilized further by other prepress computer programs.

- The complete file is saved as a PostScript (PS) file and sent through an imposition program, where it is automatically imposed in signature form once a binding method and number of signatures has been determined. The film is imposed with bleeds and trims, register marks, and creep built in.

- A thumbnail proof is prepared and verified before the file is sent to the imagesetter where the film is created.

- The film is then stripped on acetate on the light table and then bluelined full size to be sent to the customer for final approval.

- The job is now ready to be plated and put on the press.

- Print shops that are still using film to produce plates may upgrade to computer-to-plate or computer-to-press technology in the future.

- Adobe PDF files may be used to send files to the print shop alleviating the possibility of missing fonts, unlinked files, etc.

## Job Skills for Printing in a Digital World

- Computers are not making the prepress department of a print shop obsolete, although many prepress decisions are now made in the very beginning stages of a publication. Therefore, communication between the desktop publisher and/or designer and the prepress department is essential.

- Prepress personnel should have a thorough understanding of the prepress process from the creation of a document to the final stages of bindery. The prepress personnel should be willing to communicate these steps to their customers.

- Electronic prepress techniques will continue to rapidly change due to technological advances. Thus, prepress personnel must stay abreast of upgrades in equipment and software.

- Prepress employees should have the following skills.

  — Good communication skills

  — Technical skills—The knowledge of printing as it has been, and a willingness to delve into the new electronic applications and their support manuals

  — Intelligence—The desire to learn and the ability to reason; good comprehensive skills

  — Neatness—A meticulous devotion to details

  — Ability to withstand pressures of deadlines, system errors and failures, and demands for perfection in the end product

  — Dependability

## Student Supplement 3—Printing Industry References

### Magazines

*Desktop Publishers Journal*
462 Boston Street
Topsfield, MA 01983-1232
Tel: 978-887-7900
Fax: 978-887-6117
www.dtpjournal.com

*NewMedia Magazine*
P.O. Box 5310
Pittsfield, MA 01203-9998
www.newmedia.com

*Before & After Magazine*
1830 Sierra Gardens Dr. #30
Roseville, CA 95661
Tel: 916-784-3880
Toll-free: 1-877-COOLSTF (266-5783)
Fax: 916-784-3995
www.pagelab.com

*PRINT Magazine*
3200 Tower Oaks Blvd.
Rockville, MD 20852
Toll-free: 800-222-2654
Fax: 301-984-3203
www.printmag.com

*Graphic Arts Monthly*
345 Hudson St. 4th Floor
New York, NY 10014
Tel: 212-519-7320
www.gammag.com

*Publish*
Subscriber Services
P.O. Box 5039
Brentwood, TN 37024-5039
Toll-free: 800-656-7495
Fax: 615-377-0525
www.publish.com

*eMediaweekly*
P.O. Box 10633
Riverton, N.J. 08076-5033
www.emediaweekly.com

*Digital Output*
13000 Sawgrass Village Center,
Suite 18
Ponte Vedra Beach, FL 32082
Tel: 904-285-6020
Fax: 904-285-9944
E-mail: digout@mindspring.com
www.digitalout.com

*American Printer*
Reader Service Department
650 S. Clark Street
Chicago, IL 60605-9960
www.americanprinter.com

### Associations

American Institute of Graphic Arts
(AIGA)
164 Fifth Avenue
New York, NY 10010
Tel: 212-807-1990
www.aiga.org

Printing Industries of America, Inc.
(PIA)
100 Daingerfield Road
Alexandria, VA 22314-2888
Tel: 703-519-8100
www.printing.org

Graphic Communications Association
(GCA)
100 Daingerfield Road
Alexandria, VA 22314-2888
Tel: 703-519-8160
www.gca.org

Graphic Arts Technical Foundation
(GATF)
200 Deer Run Road
Sewickley, PA 15143-2600
Toll-free: 800-910-GATF
www.gatf.org

**Objective 7**

## Assignment Sheet 1—Collect Current Event Material Relating to Digital Printing

Name ____________________ Overall Rating __________

Date ____________________

| Evaluation Criteria | Rating |
|---|---|
| • Directions were followed | ______ |
| • Relevant examples of periodical material concerning digital printing were provided | ______ |

**Basic Skills**

Reading

Employability

**Introduction**

Because digital technology is making rapid changes in the printing industry on a daily basis, the printing student should know where to obtain the latest information on these changes and their effect on career choices. This exercise will help the student locate current periodical information on digital printing for investigating staffing and training needs in the face of technological changes.

**Directions**

Using Student Supplement 3, "Printing Industry References," your local library's Reader's Guide, and the Internet, collect a minimum of 12 articles from within the past 12 months from printing industry periodicals, etc. concerning the staffing and training needs for personnel in the printing industry as it moves further into digital technology. Also, include articles that deal with the changing roles of printer and customer, and the changing viewpoints each might have of cost, competition, and service. Make copies of these articles, bind them neatly together, and submit them to your instructor.

**Objective 8**

## Assignment Sheet 2—Compare and Contrast the Changes in Staffing and Training Needs in a Shop Adopting CTP Technology

Name ______________________________ Overall Rating __________

Date ______________________________

| Evaluation Criteria | Rating |
|---|---|
| • Directions were followed | ______ |
| • Report based on materials collected in Assignment Sheet 1 was provided | ______ |

**Basic Skills**

Reading Writing Critical Thinking Employability

**Introduction**

This exercise will help the student determine changes taking place because of digital printing technology and draw conclusions concerning staffing and training needs in the face of this new technology.

**Directions**

Using information collected in Assignment Sheet 1 and material in Student Supplements 1 and 2, write a report in which you discuss the changes necessary in staffing and training for a print shop which is adopting CTP technology.

Emphasize total number of employees needed today versus the past, outline skills those employees may need in today's shop for prepress activities versus those of traditional printing, and include a discussion of personnel problems and workflow problems (places where errors might creep in) that might arise as a result of the switch to digital prepress production.

**Objective 9**

## Assignment Sheet 3—Analyze Effects of Digital Printing on the Printer's and Customer's View of Cost, Service, and Competitiveness

Name ______________________ Overall Rating __________

Date ______________________

| **Evaluation Criteria** | **Rating** |
|---|---|
| • Directions were followed | ______ |
| • Report based on materials collected in Assignment Sheet 1 was provided | ______ |
| • Report showed evidence of the student's grasp of the changes underway in the industry and how they affect printers and customers | ______ |

**Basic Skills**

Reading Writing Critical Thinking

**Directions**

Based on the information you gathered in Assignment Sheet 1, write a report discussing the changing viewpoints printers and customers may have on cost, service, and competitiveness now that digital technology is changing how a job is generated, handled through production, and produced on the press.

Example: At one time, a customer brought an idea to a printer, who in turn generated type and graphics, ran a proof, and presented it to the customer for approval. Today, the customer may bring a diskette to the printer, complete with text and scanned graphics, and ask the printer to publish the material. What changes in roles have taken place, and how do those changes affect the printer's viewpoint of cost, quality control, service, and competitiveness? Conversely, discuss how the viewpoint of the customer—who now brings raw material in the form of digitized text and graphics to the printer—may be changing in relation to the same subjects.

**Objective 10**

## Job Sheet 1—Create a Camera-Ready Laser Copy of a Page Containing Text and Graphics

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

| Evaluation Criteria | Rating |
|---|---|
| • Directions were followed | ______ |
| • Finished camera-ready page containing text and graphics was produced | ______ |

**Basic Skills**

Reading Technology

**Introduction**

In this exercise, the student will become familiar with creating a camera-ready laser copy using the instructor-provided computer, page-layout software, and laser printer.

Note: The overall function of page-layout software is the same no matter which program you use. However, the commands and capabilities may differ.

**Instructions**

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

**Tools, equipment, and materials**

- Personal computer
- Page-layout software
- Laser printer
- Instructor-provided text file
- Instructor-provided graphic file (line art, chart/graph, photo)

**Procedure**

☐ 1. Open the page-layout program.

☐ 2. Create a new document.

☐ 3. Import graphic file and place on the page according to instructor's directions.

☐ 4. Type a headline for the text in the page-layout program. Place the headline on the page near the graphic.

☐ 5. Import text file, flow onto page around graphic, edit text to fit column space.

☐ 6. Check your work for accuracy on the screen.

☐ 7. Close file and output to printer. If necessary, correct errors and re-output.

Evaluator's Comments: ______________________

______________________

______________________

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